ENABLING ADULT DIABETES SELF-MANAGEMENT IN A KENYAN CONTEXT: A DESIGN SCIENCE RESEARCH APPROACH

By

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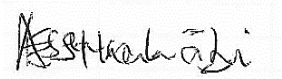
DECLARATION

I, Esther Asenahabi Opisa, declare that the thesis that I herewith submit for the doctoral degree at the University of the Free State, is my independent work, and that I have not previously submitted for a qualification at another institution of higher education.



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Signature Date

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CLARIFICATION AND OPERATIONALISATION OF CONCEPTS

This clarification and operationalisation of concepts defines key terms used throughout this thesis. This section is aimed at assisting the reader to understand the discussions that are presented in this thesis.

Concept 1: Adult diagnosed with diabetes

According to the Kenyan law chapter 17 CAP 260, an adult is an individual who has attained the age of 18 years (Government of Kenya, 2012). The *Kenya National Clinical Guidelines for Management of Diabetes* states that an individual is diagnosed to have diabetes when they are evaluated by a clinician who identifies signs of hyperglycaemia, such as polyuria, polydipsia, lethargy, pruritus vulvae, loss of weight and a random blood glucose equal or above 11.1 mmol/L; or a fasting capillary blood glucose equal or above 6.1 mmol/L and haemoglobin A1c (bA1c) above 6.5%, where available (Ministry of Public Health and Sanitation, 2010a). In this study, an adult diagnosed with diabetes will be operationalised to refer to an individual above 18 years of age who has been confirmed by a medical doctor to have either type 1 or type 2 diabetes, whether with controlled glycaemic status or not, at the time of the study.

Concept 2: Culture

Culture is defined as an

> *internalised and shared schema or framework that is used by a group or subgroup members as a refracted lens to see reality and in which an individual and the collective experience the world. Culture is created by, exists in, and adapts to the cognitive, emotional and material resources and constrains of the groups' ecologic system to ensure survival and welfare of its members and provide meaning for life (Singer, Dressler and George, 2016, p. 242).*

In the context of this study, cultural factors that were seen to affect diabetes self-management (DSM) include religious beliefs and practices, lifestyle practices, marital status, dietary factors, family responsibilities and support networks.

Concept 3: Demographics

Demographics is defined as “statistics of a population, or a section of a population” (Butler, n.d.). In this study, demographics that emerged as affecting DSM include economic factors, employment status, age, diabetes complications and comorbidities, and history of diabetes in the family.

Concept 4: Design principles

Design principles are the major knowledge outputs that are derived from development research, and are important because they inform designers when they execute their tasks (Van den Akker, 1999, p. 9). In this study, design principles refer to one of the major outputs of this study, which emanates from the articulation of PDRs and DRs that were derived throughout the phases of this study. The design principles are written in a prescriptive manner, such that they will guide other researchers in developing DSM products for other contexts. As such, these design principles are considered the major contributions of this study to the design science research (DSR) body of knowledge.

Concept 5: Design requirement

According to Wieringa (2014, p. 5), a DR is defined as “a property of the treatment desired by some stakeholders, which acts as the goal for the treatment that is to be designed”. In this study, a DR is considered to be a statement that elaborates context-specific characteristics the product that is being designed should portray.

Concept 6: Diabetes self-management

DSM refers to behaviours undertaken by the patient diagnosed with diabetes on a daily basis to manage the disease, its treatment and prevent disease progression (Liu *et al.,* 2018, p. 1). In this study, DSM refers to those lifestyle modifications that patients with diabetes adopt to control diabetes progression.

Concept 7: Distal variables

According to the integrative model of behaviour prediction (IMBP), distal variables include demographic variables, such as gender, culture, personality traits, media use and attitudes towards targets (Yzer, 2008, p. 25). In this study, the researcher conducted group discussions among adults diagnosed with diabetes in Kenya to determine distal variables affecting DSM. The distal variables that were seen to affect DSM in this study include demographic factors, cultural, emotional and attitudinal influences and exposure to interventions such as DSM education.

Concept 8: Enable

According to the Oxford English Dictionary (2021), the term enable refers to giving someone the authority or means to do something. In this study, the term enable refers to ways suggested to assist adults diagnosed with diabetes to actively participate in lifestyle modification and to contribute to DSM. This was illustrated by the practicability of a DSM product that was realised from surveys that were conducted among health care providers.

Concept 9: Health care provider

According to the Mosby Medical Dictionary (O'Toole, 2021), a health care provider is any individual, institution or agency that provides health services to health care consumers. In this study, a health care provider could be a physician, nurse, clinical officer, pharmacist, pharmacy technician, counsellor, diabetes educator or a dietician/nutritionist who cares for patients diagnosed with diabetes.

Concept 10: Practicability

Practicability, as used in DSR, refers to "the measure of utility that provides evidence for practical contributions" (Baskerville *et al.*, 2018, p. 366). In this study, practicability refers to the content of the product, procedure of use and the most suitable format for the product as it is implied by health care providers and patients diagnosed with diabetes.

Concept 11: Preliminary design requirement

PDRs are prescriptive statements, indicating a combination of the context of the problem, interventions to be applied to solve the contextual problem, prescriptive mechanisms of applying the interventions, and the outcomes expected (Denyer, Tranfield and Van Aken, 2008, p. 395). In this study, the definition of Denyer *et al.* was adapted. PDRs were considered to be prescriptive statements derived from literature that indicate the context of the problem, and possible interventions that could be used to solve a contextual problem.

Concept 12: Product

In DSR, a product, which is also referred to as an artefact, is “a thing that can be transformed in to material existence as an artificially made object” (Gregor and Hevner, 2010, p. 341). In this study, a product was designed that could serve as a guide to enable DSM by adults in Kenya.

ACRONYMS AND ABBREVIATIONS

DR/DRs	Design requirement/s
DSM	Diabetes self-management
DSR	Design science research
HbA1c	glycated haemoglobin
HIC	High income country
IDF	International Diabetes Federation
IMBP	Integrative model of behavior prediction
LMIC	Low and middle income country
NACOSTI	National Commission of Science Technology and Innovations
NHIF	National Hospital Insurance Fund
NICE	National Institute for Health Care Excellence
PDR/PDRs	Preliminary design requirement/s
SDG/SDGs	Sustainable Development Goal/s
WHO	World Health Organization

SUMMARY

Diabetes is one of the non-communicable conditions of which the prevalence is increasing globally, with a particularly sharp increase experienced in low and middle-income countries (LMICs). If diabetes is not managed properly, it can lead to physical complications, and increase the financial burden on the individual, the health care system and the government. Since diabetes is a chronic condition, self-management is key in the control of this condition. However, it is evident that most people diagnosed with diabetes exhibit an uncontrolled condition. This is an indication that diabetes self-management (DSM) is suboptimal among people diagnosed with diabetes.

The main aim of this study was to design a context-specific product that would enable DSM by adults in Kenya. This study was anchored on the integrated model of behaviour prediction (IMBP) theory, with IMBP distal variables forming the foundation for designing the product.

This study was designed using a pragmatic approach, informed by design science research (DSR). DSR comprises three cycles that are closely related. The three cycles are relevancy, design and rigour. In the relevancy cycle, the problem was investigated. Preliminary design requirements (PDRs) and design requirements (DRs) were derived. The PDRs and DRs formed part of the acceptance criteria of the product. In the design cycle, the product was finalised and its practicability determined. The iterative nature of the prototype product was due to the synthesis of data obtained during the relevancy cycle. In the rigour cycle, the prototype product was evaluated against certain evaluation criteria. The final product was then designed. These three cycles were adapted as the phases of the study. Applying the general methodology of design science research (DSR) to the current study yielded three executable phases of the research study: 1) the problem explication phase, 2) the design phase, and 3) the evaluation phase.

A multiple method design was used. In the first phase, the problem explication phase, a literature overview, a scoping review and Kawa group discussions were conducted. The findings of these three methods involve a list of four IMBP distal variables, nine PDRs

and six DRs respectively. In the second phase, the design phase, surveys and design were the two methods that were applied. The surveys yielded additional 13 DRs, giving a total of 19 DRs. This phase gave rise to a prototype product and the evaluation criteria that were used by diabetes experts in the third phase of the study. The third phase, the evaluation phase, involved expert reviews. Four diabetes experts evaluated the prototype product using the evaluation criteria. Their feedback was analysed and the findings factored in the development of the final product. The final product is a DSM guide that will be used mainly by adults diagnosed with diabetes, either on their own or with the aid of health care providers during clinic visits. In this last phase, design principles were also articulated, based on the DRs that emerged throughout the study.

This study makes a contribution to the body of knowledge in DSR, by unearthing design principles that other researchers can use to design similar studies elsewhere. Additionally, the DSM guide that emerged in this study may contribute to improved DSM by adults diagnosed with diabetes in Kenya. A context-specific DSM product was developed through the application of the DSR approach. Alongside the DSM product, the researcher also extracted DRs and design principles, which are the knowledge contribution of this study to DSR.

Keywords: design principles, diabetes, diabetes self-management, distal variables, enable, adults, health care providers, preliminary design requirements, design requirements, product

CHAPTER 1
OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This study aimed to design a diabetes self-management (DSM) product for adults diagnosed with diabetes in Kenya using a design science research (DSR) approach. DSR is a pragmatic research approach that can be used to develop practical solutions for real-world problems (Hevner and Chatterjee, 2010, p. 11). The product that was developed should enable DSM by adults diagnosed with diabetes in the Kenyan context. This study was conducted following the three phases illustrated in Figure 1.1.

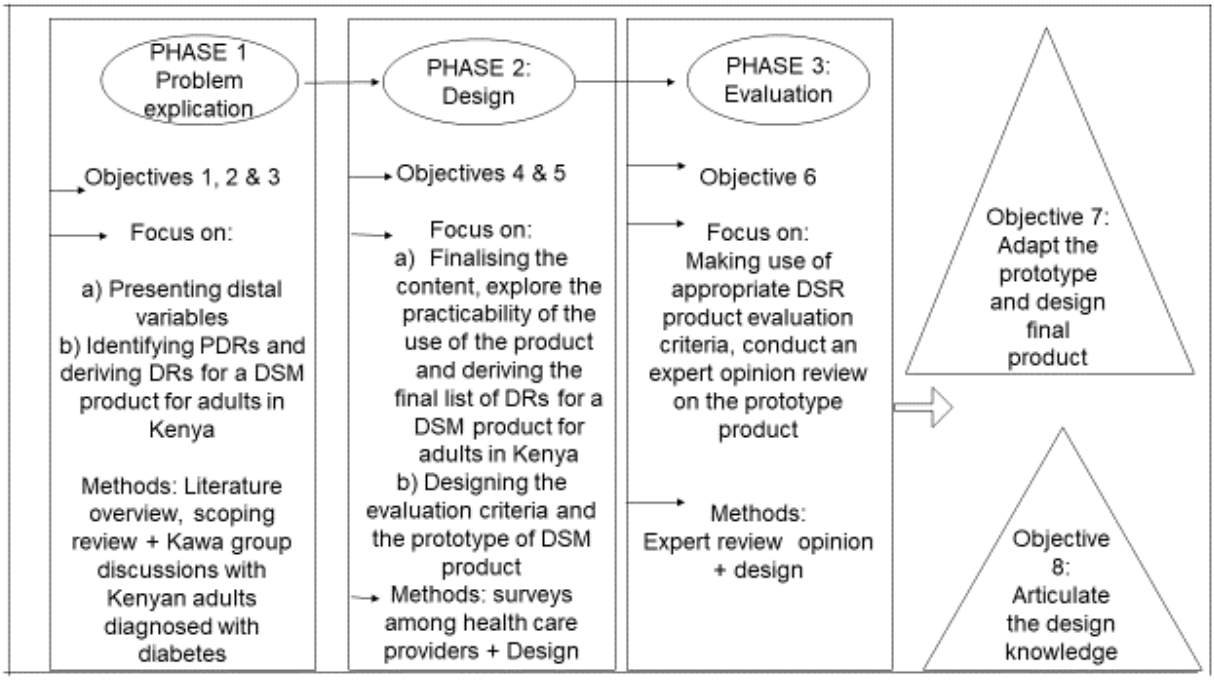

Figure 1.1: Phases of the study

In Phase 1 of the study, the researcher gathered data and presented distal variables influencing DSM by conducting an overview of relevant literature (Objective 1). This data was concurrently augmented by the data derived from a scoping review of journal articles on the topic of DSM in low and middle income countries (LMICs) (Objective 2), as well as findings from Kawa group discussions among adults with diabetes in Kenya (Objective

3). The result of Phase 1 is a preliminary product that consisted of a list of preliminary design requirements (PDRs) and design requirements (DRs), that was used in Phase 2 of the study. In Phase 2, the researcher conducted a survey among health care providers to finalise the content and the practicability (Objective 4) of a product that will enable DSM by adults in Kenya. The health care providers interrogated the preliminary product in an iterative process (Hevner and Chatterjee, 2013, p. 17) to provide information about the content of the product, the format of the product and how the product can be used for DSM by adults in the Kenyan context. The evaluation criteria, along with a prototype of the DSM product, was then designed to achieve Objective 5. The evaluation prototype product was evaluated by diabetes experts in Phase 3 of this study, in reference to the evaluation criteria. Objective 6 involved an expert review of the prototype product, after which, to achieve Objective 7, the researcher designed a final, context-specific product that would enable DSM by adults in Kenya. Achieving the final objective, Objective 8, entailed articulation of design knowledge derived throughout the study.

1.2 BACKGROUND TO THE STUDY

Diabetes is one of the non-communicable conditions of which the prevalence is on the rise globally. The global estimate of the prevalence of diabetes in 2017 was 476 million people (Lin *et al.*, 2020, p. 2). Lin *et al.* (2020) report that this figure had escalated from 211.2 million people in 1990. The number of adults living with diabetes is expected to increase to approximately 570.9 million people in 2025 and 783.2 million people by 2045 (Lin *et al.*, 2020, p. 2; Sun *et al.*, 2022, p. 6). The most recent statistics indicate that the global prevalence of diabetes in the year 2021, among adults aged 20 to 79 years, was approximately 536.6 million people, a number that reflects approximately 10.5% of the world's population (International Diabetes Federation (IDF), 2022, p. 33; Sun *et al.*, 2022, p. 6). Of the global number of people estimated to have been diagnosed with diabetes, 80% (432.7 million) live in LMICs (IDF, 2022, p. 34). This number may be lower than the actual number of people living with diabetes in these regions. Statistics show that 87.5% of people with undiagnosed diabetes live in LMICs (IDF, 2022, p. 38) . The prevalence of diabetes in Kenya, an African country classified as an LMIC, is reported to be 3.1%

(Ministry of Health, 2021, p. 13). The actual prevalence of diabetes in Kenya is likely to be higher than the reported 3.1%, as the proportion of undiagnosed diabetes stands at 52.8% (Ministry of Health, 2021, p. 13; Mohamed *et al.*, 2018, p. 24). Undiagnosed diabetes is associated with delayed treatment and diabetes-related complications (Ministry of Health, 2021).

Diabetes, if not well managed, can cause physical defects, such as blindness, and can lead to lower-limb amputation and kidney failure (World Health Organization (WHO), 2019, p. 6). These conditions are known to lead to a high mortality rate among diabetic patients. The International Diabetes Federation estimates that 6.7 million adults died from diabetes and diabetes-related complications in 2021 globally (IDF, 2022). It is projected that, by the year 2040, LMICs will have experienced a 92% increase in mortality among patients diagnosed with diabetes (Mohamed *et al.*, 2018). In Africa, where most countries are classified as LMICs, deaths attributed to diabetes were reported to be 306 000 people in 2021 (IDF, 2022, p. 56). In Kenya, it is postulated that 6% of all deaths attributed to non-communicable diseases were directly related to diabetes (Ministry of Health, 2021, p. 12).

Diabetes-related complications and deaths have a negative impact on the economies of families and countries, due to the fact that about one third of these deaths occur among people of an economically productive age, that is, individuals aged 20 to 60 (IDF, 2022, p. 55; (Ministry of Health, 2021, p. 13). Globally, the cost of managing diabetes has increased from USD 232 billion in 2007 to USD 966 billion in 2021 (IDF, 2022, p. 57). In 2018, the cost of diabetes care in LMICs ranged from USD 29.91 to USD 237.83 per person (Afroz *et al.*, 2018, p. 1). The mean cost of diabetes care in Kenya in 2019 was estimated to be USD 755.7 (Oyando *et al.*, 2019, p. 290). This imposes a direct financial burden on the majority of Kenyans, where more than 50% of the population live on less than a dollar per day, and allocate 12.7% of their income to health care (Ministry of Health, 2014, p. 3). Enabling DSM will reduce the financial burden carried by individuals and the government, because DSM will limit health care expenses.

Sufficient management of diabetes depends on self-management abilities of the individual patient. According to the National Institute for Health Care Excellence (NICE), diabetes is a metabolic condition that is commonly associated with obesity, physical inactivity, raised blood pressure, disturbed blood lipid levels and a tendency to develop thrombosis (NICE, 2020, p. 5). As it is a lifestyle condition, the success of diabetes control depends largely on how well a patient performs DSM (Iregbu and Iregbu, 2016, p. 5).

The involvement of patients diagnosed with diabetes and their family members in diabetes care plays a pivotal role in enhancing DSM (Lambrinou, Hansen and Beulens, 2019, p. 59). DSM is a key concept of and the cornerstone strategy in reducing diabetes morbidity and mortality (Ministry of Public Health and Sanitation, 2010a, p. 16). To facilitate DSM by patients in Kenya-contextualised products are required.

The government of Kenya is working to improve health for all its citizenry (Barasa, Nguhiu and McIntyre, 2018, p. 7). This endeavour is in line with the United Nations Sustainable Development Goal (SDG) 3, which promotes ensuring healthy lives and well-being for all people of all ages (United Nations, 2015, p. 6). All countries are expected to operationalise SDGs by rolling out programmes aligned to achieving this goal. Like many African countries, Kenya has embarked on implementation of strategies to achieve the SDGs by building on existing policies and guidelines, such as the National Development Strategies (Ministry of Devolution and Planning, 2017, p. iv).

Progress in the achievement of health goals in Kenya is measured by the Kenyan Health Sector Strategies and Investment Plan 2018–2023 (Ministry of Health, 2018, p. 1). This policy document has six policy objectives, including halting and reversing the burden of non-communicable diseases of lifestyle, for example diabetes (Ministry of Medical Services, 2017, p. 13). The Kenyan government has delegated responsibilities to achieve SDGs and other national health policy objectives to county governments. County governments have put in place policies that are in line with national policies, such as County Investment and Development Plans. One of the main objectives of these plans is to improve access to quality and affordable health services (Department of Finance Economic Planning and Investment, 2018 online). All these plans are aimed at supporting

integrated development planning in Kenya, and are all focused on achieving SDGs, Kenya Vision 2030, Big 4 agendas and Agenda 2063 (Department of Economic Planning and Investments, 2017, p. xiv). For the Kenyan government to achieve the health goals in these plans, the Ministry of Health, in collaboration with county governments, have developed guideline documents to operationalise diabetes management goals.

One of the core guideline documents for diabetes management in Kenya is the *Diabetes Comprehensive Care Manual* (Ministry of Public Health and Sanitation, 2010b). This manual emphasises the adoption of the diabetes comprehensive care concept to ensure optimal management of diabetes in Kenya. The diabetes comprehensive care concept was derived from the chronic disease model, which places the patient's long-term goals and competencies at the centre of the health care system (Ministry of Public Health and Sanitation, 2010b, p. 6). One of the essential elements in the chronic disease model and diabetes comprehensive care concept is self-management support, which should be detailed in contextual protocols in the country (Ministry of Public Health and Sanitation, 2010b).

Most African countries rely on diabetes care protocols developed in high-income-countries (HICs), like the United States of America and United Kingdom (Pastakia *et al.*, 2017, p. 254). The usability of such protocols is likely to be a challenge for self-management by patients diagnosed with diabetes in LMICs, because of contextual differences between LMICs and HICs. A systematic review of DSM in sub-Saharan Africa, where most of the countries are classified as LMICs, concludes that DSM in this region is suboptimal, and this state of affairs threatens the lives of people diagnosed with diabetes (Stephani, Opoku and Beran, 2018, p. 9). According to a systematic review conducted by Iregbu and Iregbu (2016, p. 3) on self-management of diabetes in Africa, most of the studies that were included in the review revealed that there is lack of understanding of diabetes as a condition, and of relevant self-management practices for diabetic patients in Africa. The need to conduct studies that will enhance self-management support for non-communicable diseases, such as diabetes, in the African context, is emphasised (Iregbu and Iregbu, 2016, p. 4). As the disease burden shifts in

LMICs, from communicable to non-communicable diseases, training and management strategies need to be reconsidered.

In the recent two decades, health care training in LMICs focused mainly on managing communicable conditions such as tuberculosis and malaria, at the expense of non-communicable diseases. This approach has severely limited the development of infrastructure designed to deal with non-communicable diseases in LMICs, and is a contributing factor to deficiencies in structures to support self-management by diabetic patients (Pastakia *et al.*, 2017, p. 259). Due to the current escalation of diabetes prevalence in Africa, there is a patient-driven demand for contextualised diabetes management strategies to control the condition and its complications (Pastakia *et al.*, 2017, p. 255).

Kenya, as an African country, lies within this bracket of countries in need of contextual DSM strategies. This study designed a DSM product that will help to operationalise the envisioned aim of improving DSM in Kenya, as widely elaborated on in the national guidelines and statutes referred to above.

1.3 PROBLEM STATEMENT

DSM is crucial for diabetes control (Ministry of Public Health and Sanitation, 2010a, p. 10). However, many studies reveal that the majority of diabetic patients in Africa have suboptimal DSM. Stephani *et al.* (2018, p. 9) indicate in their systematic review on self-management of diabetes in sub-Saharan Africa that DSM in this region is poor and poses a threat to glycaemic control. In particular, self-monitoring of blood glucose, physical activity and risk reduction behaviour were the most inadequately managed aspects of self-management in the studies included in this systematic review. Literature reveals that optimal self-management practices in Morocco are reported as follows: diet at 63.6%, physical activity 38.9%, self-monitoring of blood glucose 2.1% and foot care at 37.6% (Adarmouch *et al.*, 2020, p. 59). Research conducted in Zambia demonstrates that the majority of diabetic patients in Lusaka have poor glycaemic control, with 61.3% of the study participants presenting with uncontrolled blood glucose. In the study that was done

in Lusaka, only 13.1% reported performing self-monitoring of blood glucose. Concerning physical activity, 59.6% did not involve themselves in any regular type of physical activity at home (Musenge *et al.*, 2016, p. 4). Mendenhall and Norris (2015, p. 1) evaluated diabetes care of urban black women in Soweto, South Africa, and found that very little information was given to diabetic patients on exercise, and that these patients had little understanding of diabetes and its management (Mendenhall and Norris, 2015, p. 1).

In Uganda, participants of a qualitative study on dietary patterns had good knowledge of a healthy diet, but their practices did not correspond with their knowledge (Kiguli *et al.*, 2019, p. 1). Elsewhere, a high proportion of study participants (adults diagnosed with diabetes) at Jimma medical centre in Adis Ababa, Ethiopia, reported non-adherence to recommended physical activity and diet (Zeleke Negera and Epiphanio, 2020, p. 1). A study that was conducted at Thika Level 5 Hospital in Kenya reveals that the majority of patients diagnosed with diabetes did not adhere to recommended DSM practices (Wamucii, Kyallo and Kiage, 2020, pp. 34–35). In this study, participants also demonstrated limited knowledge of DSM. Similarly, a study conducted in Kakamega General Hospital in western Kenya found that only 21.4% of participants were able to perform self-care practices (Lugaya, Syombua and Affey, 2017, p. 1). In another study, conducted in Kenyatta National Hospital, Kenya, it was evident that a high proportion of patients diagnosed with diabetes had moderate knowledge on self-management, inadequate practices in some of the recommended self-management components, and suboptimal glycaemic control (Ndirangu, 2019, p. 30).

Several studies have attempted to identify factors that could contribute to poor DSM by patients. A systematic review that was conducted to identify factors that hinder DSM from a global perspective reveals socio-economic and health system related barriers to be key factors (Malky *et al.*, 2021, p. 1). Similar barriers have been identified in LMICs. For instance, in South Africa, research found that low socio-economic status was associated with poor DSM practices by patients visiting public hospitals in Gauteng (Mutyambizi *et al.*, 2020, p. 9). A systematic review conducted in sub-Saharan Africa on the readiness of the health care system to treat diabetes found that health care providers had inadequate

training to handle patients diagnosed with diabetes (Nuche-Berenguer and Kupfer, 2018, p. 5). Rushforth *et al.* (2016, p. 116) conducted a systematic review on barriers to effective management of Type 2 diabetes mellitus in primary care, and found that limited knowledge and skills among patients and clinicians leads to a failure to realise expected glycaemic, cholesterol and blood pressure outcomes and targets. The clinicians who were involved in the relevant studies that were included in this systematic review complained that they had received insufficient training in medical school and their places of work to promote behaviour change in diabetic patients (Rushforth *et al.*, 2016, p. e116). One clinician stated that most health care providers can manage conditions that require medication quite well, but few can give good advice for diabetes (Rushforth *et al.*, 2016, p. e116). This kind of situation definitely leaves adults diagnosed with diabetes in a state that does not enable them to provide sufficient self-management, because they do not have adequate knowledge and skills.

According to a study by Flood *et al.* (2017, p. 8) on a home-based Type 2 DSM intervention in rural Guatemala, DSM education can be delivered successfully in a setting with low resources, a high poverty rate and unique cultural characteristics. The home-based DSM education intervention that was used in Guatemala significantly improved glycated haemoglobin levels in diabetic patients in this community (Flood *et al.*, 2017, p. 7). In a randomised controlled trial in Nigeria, it was found that an intensive, structured and systematic group-based DSM education programme improved glycaemic levels of diabetic patients better than for a conventional education group (Essien *et al.*, 2017, p. 7). In Kenya, the introduction of social support to patients diagnosed with diabetes at Nakuru Level 5 Hospital brought about a slight improvement in patient education and glycaemic control (Musungu, 2020, p. 17). Despite these efforts, glycaemic control of diabetes patients in Kenya is still poor.

Some patients diagnosed with diabetes in Kenya seek alternative medical care from traditional herbalists. For instance, in a rural Tugen community in Baringo county, people living with diabetes opt for herbal medicine to control their blood sugar, without a standardised preparation or dosing (Chebor *et al.*, 2020, p. 2). In the researcher's opinion,

such practices may cause more harm than good to diabetic patients, and contribute to poor glycaemic control of diabetic patients continuing to manifest.

Poor glycaemic control of adults diagnosed with diabetes globally, regionally and locally, in Kenya, is an indication of challenges related to patient self-management. The gap in development and implementation of appropriate contextual DSM product and programmes in hospitals, regionally and locally, is a contributing factor to insufficient glycaemic control. For this reason, there was a need to develop a DSM product that will enhance DSM in Kenya. The intended product of this study was designed to limit the challenges identified in studies by other researchers. A context-specific product that will be usable by adults diagnosed with diabetes will assist to improve their DSM and glycaemic control. Furthermore, the designed principles derived from this study may be replicated in other LMICs, to enable the development of similar context-specific products across Africa.

1.4 RESEARCH QUESTION

This research study attempted to answer the question: What product enables DSM by adults most optimaly in Kenya?

1.5 STUDY OBJECTIVES

Objective 1

Present distal variables that influence DSM by adults (Literature overview)

Objective 2

Identify PDRs that will serve as tentative indicators for a DSM product for adults in LMICs (Scoping review)

Objective 3

Explore the barriers and enablers of DSM by adults in Kenya in order to inform DRs for a DSM product that will enable DSM by this population (Kawa group discussions)

Objective 4

Finalise the content and explore the practicability of the use of a DSM product for adults in Kenya (Survey)

Objective 5

Design evaluation criteria and a prototype product for expert review (Design)

Objective 6

Make use of appropriate DSR product evaluation criteria, and conduct an expert opinion review on the prototype product (Expert review)

Objective 7

Adapt the prototype and design the final product (Design)

Objective 8

Articulate the design knowledge generated throughout the study.

1.6 THEORETICAL UNDERPINNING

The researcher applied the integrative model of behaviour prediction (IMBP). The IMBP is a behavioural prediction theory that is commonly used to understand and predict health behaviours of individuals in different populations (Yzer, 2008, p. 21). The researcher chose this model because it is useful for developing interventions that aim to strengthen intentions in a given group of people who share similar background factors to perform a recommended behaviour (Fishbein and Yzer, 2003, p. 180). The IMBP was derived from the theory of reasoned action, which states that performance of a given behaviour is determined by the strength of a person's intention to perform that behaviour (Fishbein and Yzer, 2003, p. 165).

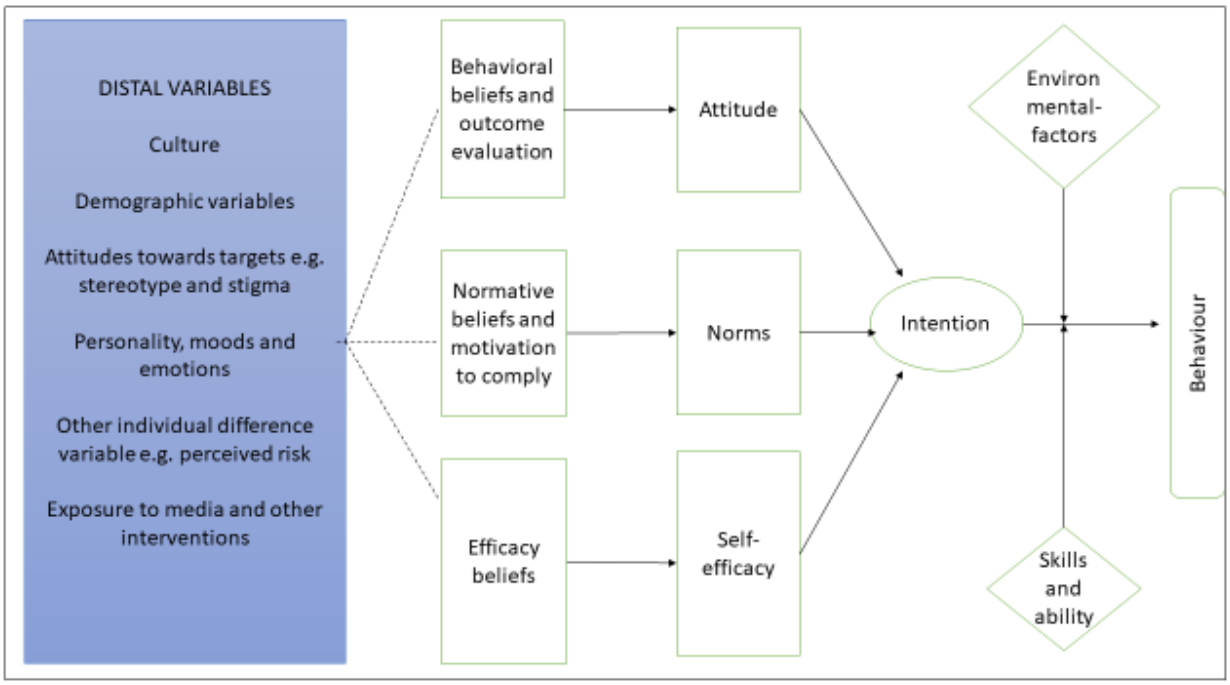

Figure 1.2: Integrative model of behaviour prediction

Source: Fishbein and Yzer (2003, p. 167)

Figure 1.2 illustrates the components of the IMBP. According to this model, a specific behaviour is more likely to occur if an individual has a strong intention to perform it, if they have the required skills, and if there is an absence of environmental constraints that can hinder the performance of the behaviour (Yzer, 2008, p. 23). Intention is determined by three determinants, namely, attitude towards performing the behaviour, perceived norms concerning performing the behaviour, and self-efficacy (Fishbein and Yzer, 2003, p. 167). These three psychosocial determinants of intention depend on the specific population being considered, as these psychosocial determinants are embedded in distal variables that are unique to any population. Therefore, understanding the nature of the distal variables in the Kenyan context enabled the researcher to develop an intervention that will strengthen the intention to perform the recommended health behaviour(s) for adults with diabetes in this context.

According to the IMBP, the distal variables illustrated in Figure 1.2 affect behaviour indirectly (Yzer, 2008, p. 26). Distal variables include culture, demographic variables, attitudes towards targets, for instance stereotypes and stigma, personality, moods and emotions, and other individual differences, for instance perceived risks, exposure to media and other interventions (Fishbein and Yzer, 2003, p. 167). These distal variables may not be visible directly when the uptake of a recommended behaviour is evaluated; however, they are crucial for any behaviour, because they form the basis of the behavioural beliefs, normative beliefs and efficacy beliefs of individuals (Yzer, 2008, pp. 25–26). In the long run, these variables determine whether a given health behaviour is accepted and performed, or not. Therefore, the researcher used the IMBP, with a specific emphasis on the distal variables.

In this study, applicable distal variables, as identified in the IMBP, were used as point of departure to generate PDRs and DRs. The DRs were used to design a context-specific DSM product for adults in Kenya.

1.7 RESEARCH PARADIGM

This study employed a *pragmatic paradigm,* as DSR is considered a pragmatic science (Hevner and Chatterjee, 2010, p. 16). Pragmatic paradigm was seen as the overarching umbrella paradigm, which created the opportunity to use other lenses within each phase of the study, as the epistemological means to interpret and understand different qualitative and quantitative data sets across the phases of the study. By applying a pragmatic paradigm to this study, the end product that was designed will help to solve the practical problem of a lack of sufficient self-management products for adults diagnosed with diabetes in Kenya.

The ontological perspective of this study was *relativism* (Levers, 2013, p. 2). Relativism states that reality is locally constructed by individuals in a specific context (Lincoln and Guba, 1994, p. 109). The researcher believes that knowledge is multiple and varies from one context to another. The reality about DSM depends on how a particular group of patients in a given context perceive diabetes and its management. In this perspective, the

reality in relation to appropriate DSM is contextually constructed by the Kenyan adults diagnosed with diabetes.

The researcher's epistemological perspective was that of *interpretivism. Interpretivism* enables a researcher to view the world according to the lived experiences of the study participants (Thanh, Thi and Thanh, 2015, p. 2). By using *interpretivism*, the researcher employed perceptions and experiences of Kenyan adults diagnosed with diabetes in the Kawa group discussions. In addition, health care providers provided their opinions on the practicability of a product that will enable DSM in Kenya. By utilising an interpretivist epistemological lens, the designer contributed to knowledge and the scientific body of evidence (Hevner and Chatterjee, 2010, p. 5). The interpretation of DSM is subjective to a particular group of people. In this study, Kenyan adults diagnosed with diabetes perceived DSM in a way that made sense to them. This was an important concept to consider when developing a product that will be meaningful to DSM. Health care providers also assigned a specific meaning to the type of product that would enhance DSM in the Kenyan context. The knowledge gained in this study is more meaningful to adults diagnosed with diabetes in Kenya than knowledge gained from conventional approaches, which may not be appreciated by adults diagnosed with diabetes, and health care providers in Kenya.

Finally, the axiological perspective of this study is one stating that the *value of research* can be found in collaboration, wide consultation and tailored design. Developing a context-specific DSM product was a collaborative responsibility that involved the input of adults diagnosed with diabetes, health care providers, diabetes experts and the researcher. The researcher believes that, by gaining the input of all stakeholders, the efficacy and practicability of the intended design was greatly improved, while future buy-in may be attained through the sense of co-ownership participants may experience as a result of participation.

1.8 RESEARCH DESIGN

This study was conducted using a DSR approach, which comprises three cycles that are closely related. The three cycles are relevancy, design and rigour (Hevner, 2007, p. 88), as illustrated in Figure1.3.

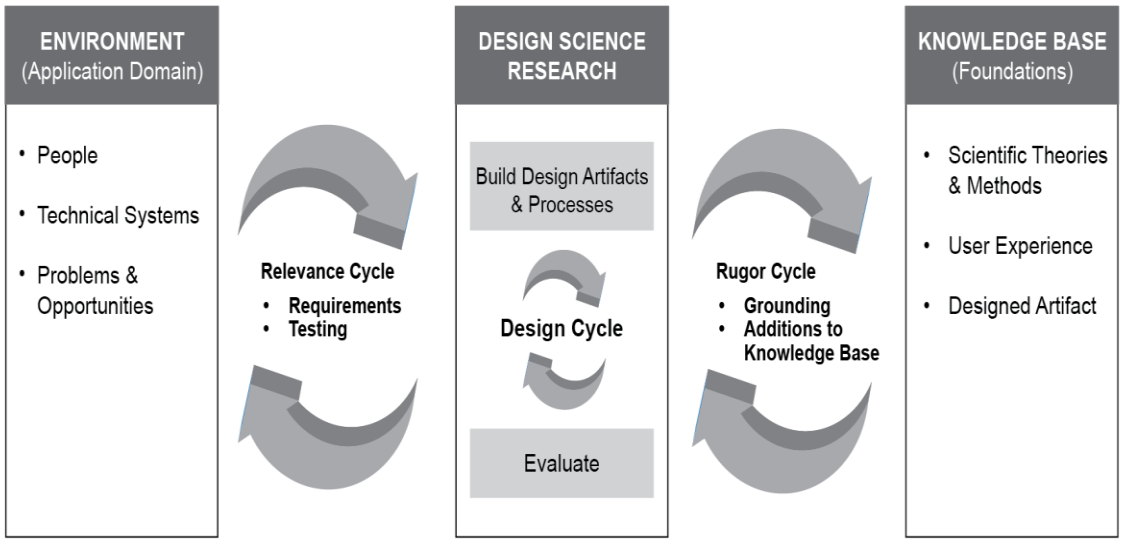

Figure 1.3: Design science research cycles

Source: Hevner (2007, p. 88)

The researcher made use of DSR resources and authors (primarily Hevner, Chatterjee and Wieringa), who primarily work in the field of product (artefact) design instead of within the sub-specialty within DSR called education design research (EDR). Seminal authors in the field of EDR, whose work contributes to the generalisable design theory, like the work of Van den Akker, Nieveen and Plomp, were also cited in instances where their contributions to overall design theory were deemed important to clarify cardinal design knowledge in the study.

Relevancy is the first cycle of DSR, and it provides the first set of DRs for the intended product (Hevner, 2007, p. 88). These DRs are extracted from a thorough investigation of the problem and indicates what criteria the final design will have to meet in order to solve

the real-world problem. Therefore, this cycle defines the acceptance criteria for the final evaluation of research results (Hevner, 2007, p. 88). In this study, the researcher extracted an initial set of PDRs from the scoping review, which were later confirmed or eliminated based on context-specific data from the empirical part of the study. The PDRs that were confirmed by the context data were extrapolated to become full DRs, and made up a part of the acceptance criteria for the product.

The design cycle is the second cycle of DSR (Hevner, 2007, p. 89). It is in this cycle that the main work of designing the product is done. In this study, the DSM product was designed to enable adults in Kenya to self-manage their diabetic condition. The design activities iterated between construction of the product and its evaluation – giving feedback to refine the product (Hevner, 2007, p. 89). These are called design iterations and each iteration produces a revised version of the product, until a prototype has been achieved for evaluation during the rigour cycle. The activities that were carried out in this phase involved finalising of the content of a DSM product and its practicability. In the design phase, the researcher designed the prototype of the DSM product, and encapsulated the DRs in the various sections of the prototype through an iterative process. The researcher also designed the evaluation criteria for the prototype. Both the DSM prototype and the evaluation criteria became inputs into the third phase of this study.

Rigour is the third cycle, and it is closely related to the relevancy and design cycles. In this cycle, the developing product was evaluated to ensure that it was not a duplicate of an existing one, and that it responded effectively to surrounding environmental needs (Hevner, 2007, p. 90). The product was evaluated against a set of post-facto evaluation criteria (Hevner*,* 2007, p. 85) that were derived from acceptance criteria defined by problem investigation, any emergent DRs throughout the study, and product development evaluation criteria. In this study, the hierarchy of criteria for information systems artefact evaluation by Prat*,* Comyn-Wattiau and Akoka (2015) was used to compile a section of the evaluation criteria. In addition to this evaluation criteria, the DRs that emerged throughout the study also formed part of the acceptance criteria as it is captured in the evaluation criteria (*cf.* Addendum 1).

The research and design processes are referred to as design science research methodology (DSRM) (Vaishnavi and Kuechler, 2015, pp. 14–15). While several authors propose similar steps in conducting a DSR study, in this study, the general methodology of design research as proposed by Vaishnavi and Keuchler (2015, p. 15) was followed. The steps are awareness of the problem, suggestions, development, evaluation and conclusion (Vaishnavi and Kuechler, 2015, p. 15), as shown in Figure 1.4.

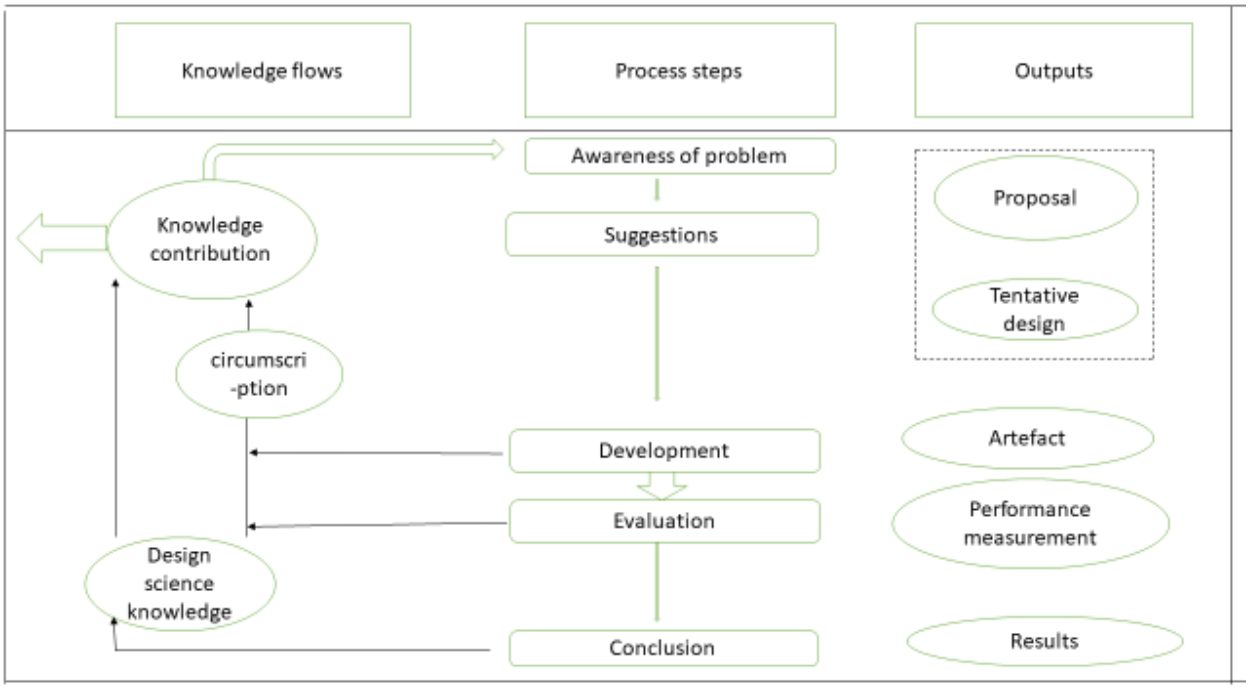

Figure 1.4: The general methodology of design science research

Source: Vaishnavi and Kuechler (2015, p. 15)

From each step of the research, PDRs and DRs are extracted to guide the construction of the product and to form the design knowledge developed throughout the study. PDRs are prescriptive statements, indicating a combination of the context of the problem, interventions to be applied to solve the contextual problem, prescriptive mechanisms of applying the interventions, and the outcomes expected (Denyer *et al.*, 2008, p. 395). According to Wieringa (2014, p. 5), a requirement is defined as “a property of the treatment desired by some stakeholders, which acts as the goal for the treatment that is

to be designed'. *In this study, a DR is considered to be a statement that elaborates context specific characteristics that the product that is being designed should portray.* At the end of the study, the PDRs and DRs are articulated as design principles that constitute the transferable technological rules that can be used to design similar products in different contexts. These design principles are the theoretical contribution of the study, while the product is the real-world contribution.

Applying the general methodology of DSR to the current study yielded three executable phases of the research study: 1) The problem explication phase, 2) The design phase, and 3) The evaluation phase. Figure 1.5 illustrates the three phases of this study, along with the objectives that were investigated in each phase.

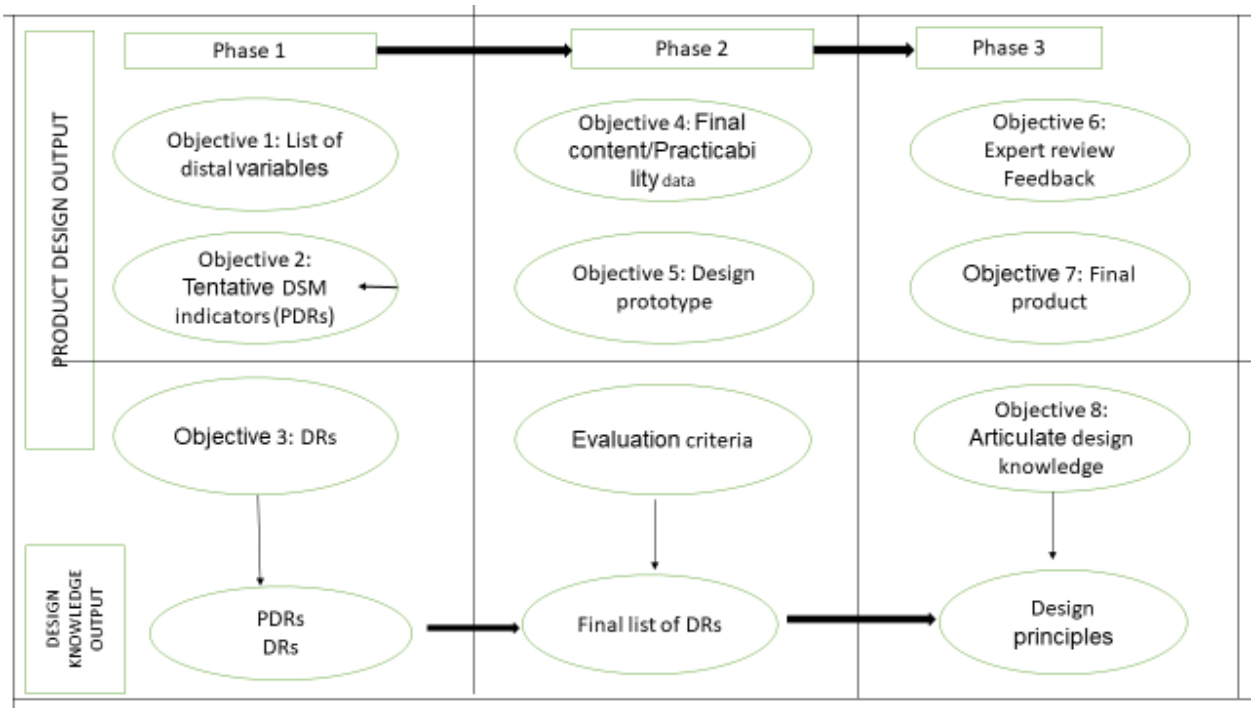

Figure 1.5: Executable phases of the study along with the objectives for each phase

Each of the three phases illustrated in Figure 1.5 had a specific focus. In Phase 1, the problem explication phase, the focus was identifying the actual problem in the environment and unearthing the initial set of acceptance criteria for the product (Hevner,

2007, p. 88). This was done by means of a literature overview, which served as a background to the study; a scoping review to identify the phenomenon of DSM in contexts similar to those in Kenya; and group discussions with adults with diabetes living in the Kenyan context. In Phase 2, the design phase, the researcher designed the content and format of the product to produce a prototype product for expert review in Phase 3. In addition, the practicability of the intended product was explored during a survey with health care workers from two health care facilities in Kenya. This allowed for the production of a context-relevant prototype. The iterative nature of the prototype product was due to the synthesis of data obtained from within the relevancy cycle. In addition, the evaluation criteria for the review of the product by expert opinion was also developed during the design phase. Phase 3 focused on obtaining expert reviews of the prototype product, finalising the product, and articulating the design knowledge generated throughout the study.

1.9 CONCEPTUAL FRAMEWORK

The following is the conceptual framework that was used for this study. The conceptual framework illustrates how different concepts flow throughout the study, as illustrated in Figure 1.6.

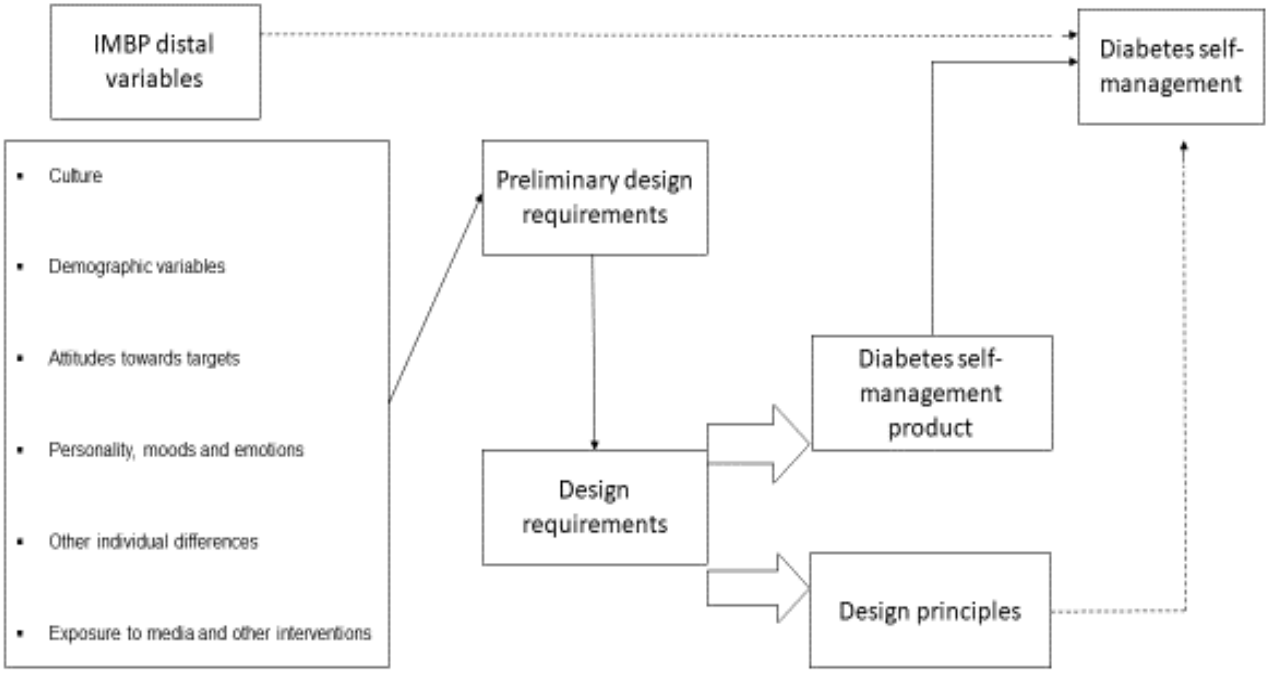

Figure 1.6: Conceptual framework of the study

Figure 1.6 illustrates how various concepts were interrelated in this study, with the IMBP distal variables that were strengthened by literature (*cf.* 2.5) emerging throughout the three phases of the study. Starting from the broad picture of IMBP distal variables, the researcher applied deductive reasoning to identify specific distal variables that influence DSM in Kenya. Extraction of PDRs from literature was anchored on possible IMBP distal variables that were identified by other authors. These PDRs, which were considered as the tentative indicators of DSM, informed the formulation of DRs. The design of the DSM product was determined by the extracted DRs. The DSM product was considered to enable DSM. The extraction of PDRs and DRs also culminated in design principles. The design principles are considered to have an influence on DSM, when they are applied by other researchers in the development of products in other populations. Generally, IMBP distal variables were seen to indirectly influence DSM.

1.10 OVERVIEW OF THE PHASES OF THE STUDY

The overview of the phases highlights the research techniques, study population, population sampling technique, study sample size, and analysis methods that were applied in the different phases of this study. Table 1.1 summarises these details.

Table 1.1: Summary of various phases of the study, reflecting research objectives, techniques, population, sample and analysis per phase

Phase 1				
Objective 1: Present distal variables that influence DSM by adults				
Technique	Population	Type of sampling	Sample size	Data analysis
Literature overview	Hand-searched journal articles and policy documents on Google Scholar	Not applicable	Not applicable	Not applicable
Objective 2: Identify PDRs that will serve as tentative indicators for a DSM product for adults in LMICs				
Scoping review	Databases from the EBSCO Host platform (Academic Search Ultimate, Africa-Wide Information, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source–-Consumer Edition, Health Source: Nursing/Academic Edition, MasterFILE Premier, MEDLINE, PsycARTICLES, PsycINFO, SocINDEX with Full Text) and Scopus.	Search-string guided-search with specific inclusion/exclusion criteria.	Nine journal articles selected	Data extraction according to distal variables in IMBP

Objective 3: Explore the barriers and enablers of DSM by adults in Kenya in order to inform DRs for a DSM product that will enable DSM for this population				
Kawa group discussions .	County referral hospitals (N=2) each caring for patients (N=250) diagnosed with diabetes per month.	Purposive	County referral hospital A with one Kawa group discussion with patients (n=3) County referral hospital B with 5 group discussions with patients (n=10, n=10, n=3, n=3, n=3)	Thematic analysis
Phase 2				
Objective 4: Finalise the content and explore the practicability of the use of a DSM product for adults in Kenya				
Surveys	N=304 health care providers in hospitals A and B Nurses: 175 Doctors: 21 Clinical officers: 29 Nutritionists/dieticians: 9 Pharmacists: 37 Pharmacy technologists: 22 Counsellors: 9 Diabetes educator: 2	Purposive sampling	102 participants from two hospitals. Nurses: 53 Doctors: 10 Clinical officers: 8 Nutritionists/ dieticians: 12 Pharmacists: 12 Pharmacy technologists: 4 Counsellors: 3 Diabetes educator: 1 (doubles up as counsellor)	Descriptive statistics, that is frequencies and percentages
Objective 5: Design an evaluation criteria and the prototype product for expert opinion review				
Design	Researcher facilitated by promoters	Not applicable	Not applicable	Not applicable

Phase 3				
Objective 6: Make use of appropriate DSR product evaluation criteria, conduct an expert opinion review on the prototype product				
Expert reviews	Medical doctor Nutritionist Diabetes nurse Diabetes educator	Purposive	Medical doctor: 1 Nutritionists: 2 Diabetes nurse: 1 Diabetes educator: 1 (doubles up as a nutritionist)	Adapted evaluation criteria of Prat *et al* (2015) and 19 DRs
Objective 7: Adapt the prototype and design the final product.				
Design	Not applicable	Not applicable	Researcher	Design
Objective 8: Articulate the design knowledge generated throughout the study				
Knowledge articulation	Not applicable	Not applicable	Researcher	Not applicable

After completion of all the phases of research, the design knowledge generated during the study was articulated. Design principles were formulated based on PDRs and DRs that emerged throughout the course of the study. The design principles were formulated as follows (1999, p. 9).

> *If you want to design intervention X for the purpose/function Y in context Z, you are best advised to give these intervention characteristics A, B and C [substantive emphasis], and to do that via procedures K, L, M [procedure emphasis], because of arguments P, Q and R.*

1.11 OVERVIEW OF ETHICS PRINCIPLES AND RIGOR FOR THE DIFFERENT RESEARCH TECHNIQUES

The overview of the ethics principles and study rigor for the research techniques that were applied in this study a illustrated in Table 1.2; an in-depth discussion will be provided in Chapter 3.

Table 1.2: Overview of the ethics principles and rigor for the various research techniques

Research technique	Ethics principles	Methodological rigor
Literature overview	Utilising the Singapore statement principles (Steneck, Mayer and Anderson, 2010, p. 1) Honesty: Accurate reporting of data from selected studies Good stewardship: Referencing of data	Dependability: Utilising published policy documents and journal articles
Scoping review	Utilising the Singapore statement principles (Steneck *et al.*, 2010, p. 1) Honesty: Accurate reporting of data from selected studies Accountability: Data record keeping and reproducibility Good stewardship: Referencing of data.	Adapting steps of methodological framework of Arksey and O'Malley (2005, p. 22). Transferability: Using a research string Dependability: Choice of suitable articles Credibility: Data charting
Kawa group discussions	Observing the Belmont report ethical principles (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, pp. 4–9). Justice: Selecting study subjects fairly Beneficence: Enhancing DSM by patients diagnosed with diabetes. Respect for persons: Observing autonomy, by obtaining informed consent and respecting voluntary participation. Privacy and confidentiality: Observing de-identification of participants.:	Observing steps of Kawa river model utelisation (Wada, 2011, p. 231). Credibility: Group discussions conducted in Swahili Transferability: Deductive reasoning informed by established IMBP distal variables, utilisation of the first two steps of the Kawa river model Dependability: Enough time for drawing the personal rivers, researcher trained on conducting group discussions using Kawa model Confirmability: Audio recording of group discussions and taking field

		notes, referring to participants' own words.
Surveys (questionnaire)	Belmont Report ethics principles (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, pp. 4–9) Justice: Avoiding exploitation of study participants, selecting participants according to inclusion/exclusion criteria. Beneficence: Maximising benefits of the study; obtaining information on practicability of a DSM product that will reduce over-reliance of patients diagnosed with diabetes on health care providers in the long run. Respect of persons: Obtaining ethics approvals, observing autonomy through informed consent, voluntary participation, and ensuring privacy and confidentiality.	Reliability: Questionnaire designed in line with IMBP distal variables derived from context specific literature and adults diagnosed with diabetes in Kenya
Design	Utilising the Singapore Statement principles (Steneck *et al.*, 2010, p. 1) Integrity: Use of free-to use online photos	Credibility: Utilising expert reviews feedback in designing the final DSM guide Transferability: Utilising DSR phases in designing and redesigning of the DSM guide
Expert reviews	Belmont Report ethics principles (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, pp. 4–9) Justice: Avoiding exploitation of study participants, selecting participants according to inclusion/exclusion criteria, collecting data at a convenient time and avoiding interference with participants' routine work. Designing the study in a way that participants will not bear any financial burden. Beneficence: Exposing participants to minimal risk. Respect of persons: Obtaining ethical approvals, observing	Utilising expertise authority Validity: Using DSR evaluation criteria (Prat *et al.*, 2015, p. 6) Confirmability: Observing a systematic approach of designing the prototype through different phases of the study. Transferability: Utilising DRs derived in the study that will allow other researchers to design

	autonomy through informed consent, voluntary participation, and ensuring privacy and confidentiality	similar products for similar contexts.

1.12 LAYOUT OF THE THESIS

The layout of this thesis is as follows.

Chapter 1: Layout of the thesis

Chapter 2: Literature overview

Chapter 3: Research methodology

Chapter 4 Scoping review

Chapter 5 Kawa group discussions

Chapter 6 Survey findings

Chapter 7 Findings of the expert reviews

Chapter 8 Articulation of design knowledge, significance of the study, study limitations, conclusion and recommendations

CHAPTER 2
LITERATURE OVERVIEW: DIABETES AND DIABETES SELF-MANAGEMENT

2.1 INTRODUCTION

Diabetes is one of the most prevalent non-communicable conditions, of which the incidence is increasing every year. Even as the global prevalence of diabetes increases, the burden of this condition is highest in under-resourced low and middle income countries (LMICs), where 79.4% of people with diabetes reside (IDF, 2019a, p. 34). Diabetes causes a variety of health complications that limit the quality of life of patients, and may even also cause premature death (IDF, 2019a, p. 54). Considering these adverse effects of diabetes, this chapter aims to provide background information on diabetes, DSM and the emerging distal variables that influence DSM (Fishbein and Yzer, 2003, pp. 166–167).

The first section of this chapter will discuss concepts, such as the definition and diagnostic criteria of diabetes, broadly. Diabetes prevalence in high income countries (HICs) and LMICs (including Kenya) will be discussed, as will the classification of diabetes. The classification distinguishes between Type 1 and Type 2 diabetes, which form the topic of this study, even though there are other types of diabetes. The second section of this chapter will focus on DSM, which is the cornerstone of diabetes management (Ministry of Public Health and Sanitation, 2010c, p. 51). DSM concepts will be discussed in alignment with distal variables of the Integrative Model of Behavior Prediction (IMBP). The third section of this chapter will discuss the burden of diabetes care and the need for a DSM product. The final section of this chapter will focus on the IMBP-related distal variables (Fishbein and Yzer, 2003, p. 167) that emerged during the literature study.

2.2 DIABETES

This section will elaborate on the various concepts that are related to diabetes, such as definition and diagnostic criteria, and the prevalence of diabetes globally, regionally and

in the Kenyan context. This section will also elaborate on the two main types of diabetes, that is Type 1 and Type 2 diabetes, which were the focus of this study.

2.2.1 Definition and diagnostic criteria of diabetes

Diabetes mellitus, which is simply referred to as diabetes, is defined as a group of metabolic disorders that is characterised by hyperglycaemia (WHO, 2019, p. 1; Punthakee, Goldenberg and Katz, 2018, p. S10). Since there are no other specific biological markers to define diabetes, estimation of blood glucose values remains the main approach to diabetes diagnosis (WHO, 2019, p. 9). The diagnostic criteria of the WHO for diabetes include a fasting plasma glucose level of 7 mmol/L and above, glycated haemoglobin (HbA1c) of 6.5% and above, random plasma glucose level of 11.1 mmol/L and above, and two-hour post-load plasma glucose above 11.1 mmol/L (WHO, 2019, p. 6). In the latest version of Kenya's *National Clinical Guidelines for Management of Diabetes Mellitus* (Ministry of Public Health and Sanitation, 2010a, p. 2), the diagnostic criteria for diabetes are stipulated as random capillary whole blood glucose of 11.1 mmol/L and above, or a fasting capillary whole blood glucose above 6.1 mmol/L. Clinical presentation of signs of hyperglycaemia, such as polydipsia, polyuria, pruritus vulvae, weight loss, polyphagia and general body weakness, should be considered alongside the biochemical tests (Ministry of Public Health and Sanitation, 2010a, p. 2). Prediabetes individuals who do not present with signs of hyperglycaemia, but who have impaired glucose levels, should also be identified as early as possible (Ministry of Public Health and Sanitation, 2010a, pp. 2–3). Glucose levels for different populations help epidemiologists to calculate the prevalence of diabetes (IDF, 2019a, p. 25).

2.2.2 Prevalence of diabetes

Diabetes prevalence will be discussed from global, LMIC and Kenyan perspectives. Diabetes is a major health concern, and its global prevalence has increased over the years (Saeedi *et al.*, 2019, p. 1).

2.2.2.1 Global prevalence of diabetes

In 2019, the global prevalence of diabetes was 9.3%, which translates to 463 million adults aged 20 to 79 years (IDF, 2019a, p. 34; Saeedi *et al.*, 2019. p. 1). According to a recent publication of the Non-Communicable Disease (NCD) Risk Factor Collaboration (2016, p. 1), on global trends of diabetes, this figure has risen, from 108 million people in 1980, to 422 million people in 2014. It is estimated that the global prevalence of diabetes will increase to 10.2% (578 million people) by the year 2030, and 10.9% (700 million people) by the year 2045, unless sufficient measures are taken to control this disease (Saeedi *et al.*, 2019, p. 1). Global prevalence estimates indicate that the prevalence of diabetes in urban regions is higher (10.8%) than in rural areas (7.2%) (Saeedi *et al.*, 2019, p. 1). Out of the 463 million people who were living with diabetes in 2019, half (50.1%) had not been aware that they had diabetes (Saeedi *et al.*, 2019, p. 5). Among undiagnosed diabetic individuals globally, 84.3% are in LMICs (Saeedi *et al.*, 2019, p. 5).

2.2.2.2 Diabetes prevalence in LMICs

Diabetes prevalence in developing countries has a more rapid rate of increase than that in HICs (NCD Risk Factor Collaboration, 2016, p. 1: WHO, 2016, p. 2). For instance, it is estimated that the prevalence of diabetes in the African region, where the majority of the countries are classified as LMICs, will increase to an alarming 142% (Saeedi *et al.*, 2019, p. 4) from 2019 to 2045. Prevalence of diabetes in Africa in 2019 was 4.7% (19 million) and it is estimated that this number will rise to 5.1% (29 million people) in 2030 and 5.2% (47 million) people by 2045 (IDF, 2019b).

2.2.2.3 Diabetes prevalence in Kenya

The prevalence of diabetes in Kenya, an African country, is also increasing. A national survey that was conducted in Kenya using data derived from the 2015 national STEPs survey among adults aged 18 to 69 years found a diabetes prevalence rate of 2.4% (Mohamed *et al.*, 2018, p. 112). In 2019, the prevalence of diabetes in Kenya was 2.2%, which represents 552 400 people (IDF, 2019b, p. 2) – IDF prevalence rates are derived

from peer-reviewed papers and national health surveys (IDF, 2019a, p. 24). The discrepancy in the reported prevalence rates could be attributed to the sources of data used by different authors.

Age-adjusted prevalence is higher for urban dwellers (3.4%) than rural dwellers (1.9%) (Mohamed *et al.*, 2018, p. 113). The rate of undiagnosed diabetes is also showing a steady increase. According to Meme *et al.* (2015, p. 4), the prevalence of undiagnosed diabetes in 2014 was 32% in Kenya. In 2019 this percentage increased to 44% (IDF, 2019b, p. 2).

The prevalence of diabetes presented here mostly refers to persons diagnosed with diabetes classified as Type 2 diabetes (IDF, 2019a, p. 35). The classification of diabetes will be discussed in the next section.

2.2.3 Classification of diabetes

Diabetes is classified as Type 1, Type 2, gestational, or other forms of diabetes that are associated with other medical conditions (WHO, 2019, p. 13; Ministry of Public Health and Sanitation, 2010a, p. 1–2). For the sake of this study maintaining a consistent focus, Type 1 and Type 2 diabetes will be discussed in more detail.

2.2.3.1 Type 1 diabetes

Type 1 diabetes, which was previously referred to as juvenile or insulin-dependent diabetes, accounts for 5 to 10% of all diabetes cases (American Diabetes Association, 2018, p. S17; Ministry of Public Health and Sanitation, 2010b, p. 2). It is more prevalent in children, but it also affects adults (WHO, 2019, p. 13).

The majority of individuals with Type 1 diabetes have a great genetic risk of acquiring Type 1 diabetes (WHO, 2016, p. 12). A large proportion (70 to 90%) of people diagnosed with Type 1 diabetes have an immunological problem that involves autoantibodies, which is the distinctive diagnostic criterion. The autoantibodies are directed against beta cells of the islets of Langerhans (WHO, 2019, p. 14). A minority of Type 1 diabetics have an idiopathic pathophysiology, where there is no evidence of autoantibodies, and no

evidence of beta cell destruction, and yet the individual has insulinopenea (American Diabetes Association, 2018, p. S17) that is accompanied by absence of C-peptides.

Insulin deficiency in people with Type 1 diabetes leads to acute clinical manifestations, which include acute symptoms of hyperglycaemia (American Diabetes Association, 2018, p. S17). Type 1 diabetic patients are prone to diabetes ketoacidosis, because of a total absence of insulin (WHO, 2019, p. 14).

Because these patients lack endogenous insulin secretion, the main mode of treatment is insulin administration (Ministry of Public Health and Sanitation, 2010a, p. 12). Non-pharmacological treatment approaches, such as health education, recommended dietary practices and physical activity, also form part of the general management of Type 1 diabetes patients (Ministry of Public Health and Sanitation, 2010b, p. 3). Complications associated with Type 1 diabetes include macro vascular and micro vascular disease, nephropathy, retinopathy and neuropathy (Ministry of Public Health and Sanitation, 2010b, p. 3). These complications are similar to those seen in Type 2 diabetes.

2.2.3.2 Type 2 diabetes

Type 2 diabetes, which was formerly called non-insulin-dependent diabetes or adult-onset diabetes, accounts for 90 to 95% of all diabetes cases (American Diabetes Association, 2018, p. S19; WHO, 2019, p. 14). Type 2 diabetes is predominantly diagnosed in adults, but it can also be found in children (IDF, 2019a, p. 14; WHO, 2016, p. 26). Irrespective of the age at which the diagnosis is made, Type 2 diabetes is associated with relative insulin deficiency and/or resistance to circulating insulin (American Diabetes Association, 2018, p. S19; Ministry of Public Health and Sanitation, 2010b, p. 2). Insulin resistance is strongly associated with obesity (American Diabetes Association, 2018, p. S19), which is an indication of lifestyle patterns that pose a risk for diabetes.

Lifestyle risk factors associated with Type 2 diabetes include changes in dietary practices, such as increased intake of refined foods and fats, reduced physical activity, and smoking habits (WHO, 2019, p. 14). Other risk factors of Type 2 diabetes include ethnicity, family

history of diabetes, history of gestational diabetes, and advanced age (WHO, 2016, p. 16).

People who are exposed to these risk factors may not be aware of it. The majority of people with Type 2 diabetes remain undiagnosed for a long time, and are diagnosed later in the course of the disease (WHO, 2019a, p. 15). Diagnosis of Type 2 diabetes is mainly linked to hyperglycaemia that is not associated with auto-immune pathology or other underlying conditions (American Diabetes Association, 2018, p. S19). People with Type 2 diabetes may have sufficient levels of insulin, but this insulin does not surmount the existing hyperglycaemic state (American Diabetes Association, 2018, p. S19).

The classical presentation of Type 2 diabetes includes signs and symptoms of hyperglycaemia, such as polyphagia, polydipsia, polyuria, sepsis and hyperosmolar nonketotic syndrome (Ministry of Public Health and Sanitation, 2010a, p. 1). People with Type 2 diabetes rarely present with ketosis, because, although the patient experiences insulin resistance, the minimal insulin available in circulation hinders lipolysis (American Diabetes Association, 2018, p. 19). Insulin resistance appears to subside with sufficient management, including weight reduction (American Diabetes Association, 2018, p. S19). As a lifestyle condition, the success of diabetes control largely depends on how well a patient performs DSM (Iregbu and Iregbu, 2016, p. 5), which is the cornerstone of diabetes management (Ministry of Public Health and Sanitation, 2010c, p. 51).

2.3 DIABETES SELF-MANAGEMENT

This section focuses on DSM concepts that are the cornerstone of diabetes management and the niche area of this study. DSM refers to daily behaviours undertaken by diabetes patients to manage the disease and its treatment, to prevent disease progression (Liu *et al.,* 2018, p. 1). The principles adopted in DSM are mainly lifestyle modifications, which include *dietary modification, increasing physical activity, self-monitoring of blood glucose* and *adhering to anti-diabetes medication* (Bekele *et al.*, 2020, p. 1).

These principles of lifestyle modification are aligned with distal variables that are identified in the IMBP, in which this study is grounded, and which is an extension of the theory of

reasoned action (Yzer, 2013, p. 22). The IMBP emphasises skills and environmental enablers/barriers that influence intention to perform certain behaviours (Yzer, 2013, p. 23). Behind intentions, there are distal variables such as culture, demographics, personality traits, individual differences and media (Yzer, 2013, p. 25), which indirectly affect behaviour. The alignment of IMBP distal variables and DSM lifestyle modification are illustrated in Figure 2.1.

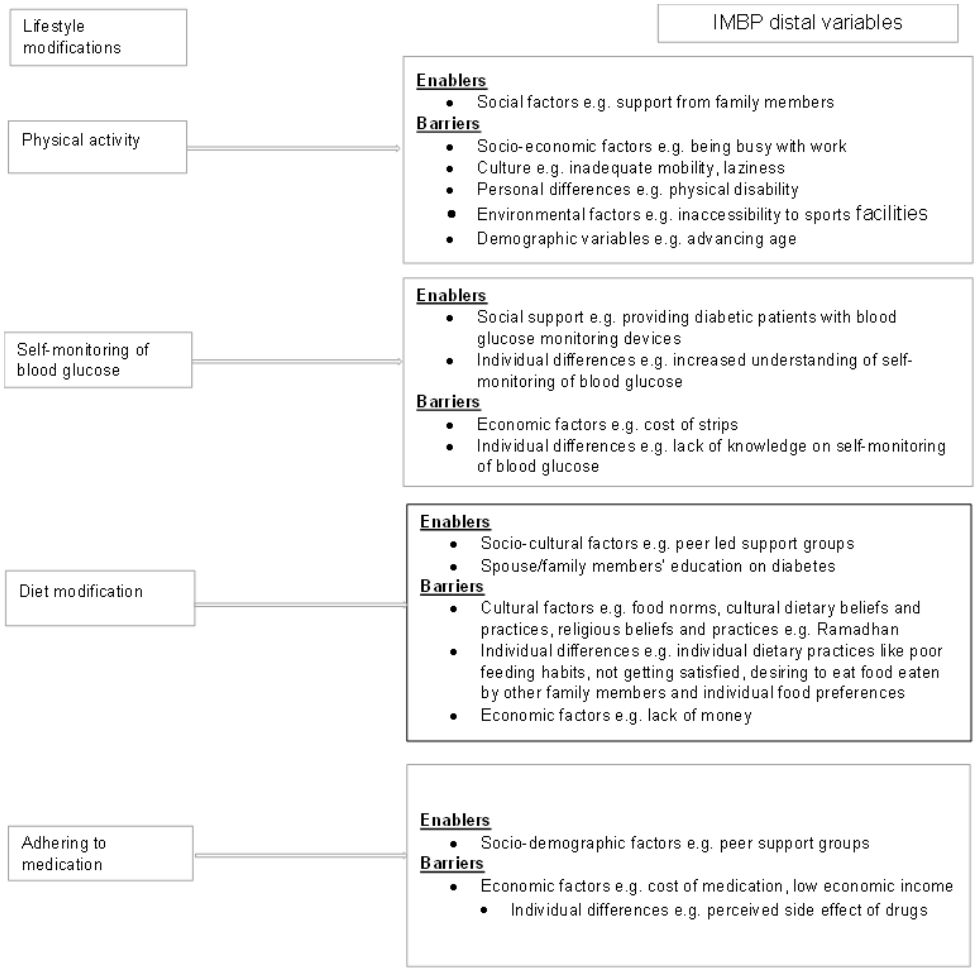

Figure 2.1: Alignment of lifestyle modifications of patients diagnosed with diabetes with individual variables of IMBP

A discussion related to DSM will be presented next, with a specific focus on how lifestyle modifications and their associated IMBP distal variables present globally and within the Kenyan context. The first DSM modification discussed is *increased physical activity.*

2.3.1 Physical activity

The latest IDF clinical recommendations for managing Type 2 diabetes in primary care (IDF, 2017a, p. 25), proposes *increased physical activity* as a crucial component of DSM. IDF recommendations stipulate that patients with diabetes should engage in moderate intensity physical activity for 30 to 45 minutes per session, three to five days per week, or a total of 150 minutes per week (IDF, 2017a, p. 16). Adu *et al.* (2019, p. 14) conducted a global study on enablers of and barriers to DSM, and report that participants had inadequate skills for planning physical activities that could limit the occurrence of hypoglycaemia, or to inform medication adjustment decisions. According to Sarpooshi *et al.* (2020, p. 115), other barriers to physical activity that were identified among Iranian Type 2 diabetic adults included lack of access to sports facilities, laziness, being too busy to exercise, and disability caused by illness. In addition to these barriers, factors such as support from family members was seen to enable physical activity by diabetic patients in Iran (Sarpooshi *et al.*, 2020, p. 115).

In LMICs, the most commonly identified enabler of physical activity by diabetes patients was walking to work. A high level of exercise was reported by diabetes patients in Ghana, mainly because they had to walk to their workplaces (Mogre *et al.*, 2017, p. 5). These Ghanaian participants reported exercising for 30 minutes on an average of 4.37 days per week (Mogre *et al.*, 2017, p. 4). Similarly, in a study conducted in Ethiopia, more than half the participants reported engaging in regular exercise, which was associated with walking to the place of work (Diriba, Bekuma and Bobo, 2020, p. 8). In contrast, a systematic review of self-management of diabetes in sub-Saharan Africa, by Stephani, Opoku and Beran (2018, p. 10), found that, although most of the diabetic atients were aware of the importance of physical activity, the rate at which the participants adhered to physical activity was suboptimal, ranging from 29% to 49%. The most commonly performed physical activity was brisk walking (Stephani *et al.* 2018, p. 10). Elsewhere, in Abadan,

Iran, a study on self-care behaviours of diabetic patients showed that they engaged in moderate physical activity that was inversely related to age (Baghbani *et al.*, 2019, p. 75).

Like in other LMICs, physical activity engagement by diabetic patients in Kenya was found to vary from one study to another. A study that was conducted at Thika Level 5 Hospital in central Kenya revealed that 55.8% of diabetic patients engaged in the recommended physical activity (Wanyoike, Kahiga and Gachau, 2019, p. 976). In another study, conducted in Longisa Level 4 Hospital in Kenya, slightly over half of study participants engaged in physical activities that could increase their heart rate for at least 10 minutes (Rono, Ngure and Mutai, 2018, p. 34). Low levels of engagement in physical activity was reported in the coastal region of Kenya (Abdulrehman *et al.*, 2016, p. 10), where the majority of the people have a sedentary lifestyle.

In the literature presented, physical activity levels are seen to be closely related to IMBP distal variables, which act as either barriers or enablers of DSM. The IMBP cultural distal variable that was seen to enable physical activity is social support from family members. Several IMBP distal variables are implied as barriers to physical activity. These include socio-economic factors, such as being busy with work; lifestyle practices, such as inadequate mobility and lazines; demographic variables, such as advanced age; environmental factors, such as inaccessibility of physical activity facilities; and personal differences, such as physical disability. These barriers were reported on a global scale. Consideration of physical activity practices of diabetic patients is crucial, since these activities are known to lower plasma glucose levels, which can be determined by self-monitoring blood glucose.

2.3.2 Self-monitoring of blood glucose

The IDF guidelines (2012) refer to *self-monitoring of blood glucose*, and recommend that blood glucose is self-monitored as a compulsory approach by diabetic patients on insulin therapy, and an optional approach for those on oral hypoglycaemic agents (IDF, 2012, p. 50). Additional recommendation in the 2017 IDF publication (2017a, p. 13) on diabetes management is that self-monitoring of blood glucose should be done during intense

exercise, before driving and during acute illness. Self-monitoring of blood glucose has been found to be a more common practice in HICs than is the case in LMICs.

Sapkota, Brien and Aslani (2017, pp. 6–7) conducted a comparative study on blood glucose monitoring among Nepalese and Australian diabetic patients. They found that the Australian participants frequently performed home-based blood glucose monitoring using glucometers, while Nepalese participants mainly relied on laboratory monitoring of blood glucose. The Australian participants had a better understanding of self-monitoring of blood glucose and they had been provided with devices and facilities that enhanced this habit. In contrast, some of the Nepalese participants reported that they did not know how to use the glucometer and they did not believe glucometer results. Other studies also found suboptimal self-monitoring of blood glucose in LMICs (Stephani *et al.*, 2018, p. 8; Mogre *et al.*, 2017, p. 5; Bonger, Shiferaw and Tariku, 2018, p. 965).

According to Stephani *et al.* (2018, p. 8), self-monitoring of blood glucose is generally suboptimal in LMICs. In Ghana, the self-care practice that was performed worst was blood glucose testing, with only one participant reporting to monitor their blood glucose on a daily basis (Mogre *et al.*, 2017, p. 5). Similarly, in Nigeria, 32% of participants failed to adhere to self-monitoring of blood glucose and more than half, 57.5%, did not own a glucometer (Hope *et al.*, 2020, p. 8). In Addis Ababa, Ethiopia, 83.5% of the study participants did not adhere to recommendations for self-monitoring of blood glucose (Bonger *et al.*, 2018, p. 965).

Lack of adherence to recommendations for self-monitoring of blood glucose is also documented by a few Kenyan studies (Abdulrehman *et al.*, 2016, p. 6). Kenyan coastal dwellers demonstrated insufficient self-blood glucose monitoring; people who owned glucometers reserved them for emergency use only (Abdulrehman *et al.*, 2016, p. 6). The study participants who owned glucometers tested their glucose levels on very few occasions, citing the reason as being the high cost and unavailability of glucose strips in the local town of Lamu (Abdulrehman *et al.*, 2016, p. 6).

Considering the global and Kenyan data presented about self-monitoring of blood glucose, it is evident that there is a link between IMBP distal variables and self-monitoring

of blood glucose. IMBP distal variables that are seen to impede self-monitoring of blood glucose include economic factors, such as the high cost of strips and glucometers, and environmental factors, such as unavailability of strips in the local setting. The other IMBP distal variable that is discussed as a barrier to self-monitoring of blood glucose is individual differences, such as lack of knowledge and skills on how to use a glucometer, and lack of trust in glucometer results. In turn, the IMBP distal variables that tend to increase self-monitoring of blood glucose include enhanced individual differences, such as improved understanding of self-monitoring of blood glucose, and environmental factors, such as availability of blood glucose monitoring devices. Facilitating diabetic patients to improve self-monitoring of blood glucose can assist them to modify their dietary practices.

2.3.3 Dietary modifications

Dietary modifications are considered to be crucial for diabetes management (IDF, 2017a, p. 15). To enable people with diabetes to practice proper dietary self-care, the IDF guidelines for diabetes management recommends the following approaches: reducing energy consumption, which can be done by consuming foods that are high in fibre, and introducing a low-glycaemic-index diet (IDF, 2017a, p. 15; IDF, 2012, p. 32). People with diabetes are advised to avoid unhealthy practices, such as eating out and choosing the unhealthy foods (IDF, 2017, p. 15). By making the right dietary choices, people with diabetes who are overweight could reduce their caloric intake by 500 to 600 calories per day (IDF, 2017a, p. 15). After achieving optimal body weight, people with diabetes should maintain an intake of 800 to 1 200 calories per day, assisted by a nutritionist to maintain appropriate caloric intake (IDF, 2017a, p. 15). The researcher was not able to obtain data on dietary practices of people with diabetes in HICs to determine if these recommendations are adhered to. In LMICs, there is moderate adherence to diet plans (Stephani *et al.*, 2018, p. 9).

A systematic review of studies conducted in sub-Saharan Africa, where most of the countries are classified as LMICs, reveals that nutritional practices appear appropriate, though suboptimal (Stephani *et al.*, 2018, p. 8). Dietary practices of Ghanaian study

participants were found to be suboptimal (Mogre *et al.*, 2017, p. 5), as only 15% of them reported eating fruits and vegetables every day, and less than one third of the participants followed an eating plan (Mogre *et al.*, 2017, p. 5). In Ethiopia, research revealed that 74.3% of diabetic study participants had poor adherence to dietary recommendations (Ayele *et al.*, 2018, p. 3). Similarly, 50% of study participants of a Tanzanian study did not adhere to dietary recommendations (Akyoo *et al.*, 2019, p. 35373). A study that was conducted among Xhosa-speaking participants in Langa township in Cape Town, South Africa, found that the participants considered obesity to be a sign of happiness and wealth (Masupe *et al.*, 2018, p. 47).

In addition to cultural beliefs and practices related to diet, other barriers to dietary modifications, including lack of money, were also identified in LMICs. Results of a cross-sectional study that was conducted in Harare, Zimbabwe, found that a lack of money to buy food, being obligated to attend social functions, failing to achieve satisfaction, and desiring to eat the foods other family members eat were some of the barriers to diet modification (Chilala *et al.*, 2016, p. 83). Barriers to diet adherence by participants in North West Ethiopia included lack of knowledge/education on dietary behaviours, inability to afford the recommended diet, a lack of belief in the use of diet to control diabetes, and a lack of formal education (Ayele *et al.*, 2018, p. 3). Individual food preferences and family eating habits are some of the major challenges facing diet modification by people with diabetes in sub-Saharan Africa (Bekele *et al.*, 2020, p. 9). Involvement in social meetings and sociocultural food norms are other hindrances to diabetic control in sub-Saharan Africa (Bekele *et al.*, 2020, p. 9).

Kenya, as a sub-Saharan country, faces several sociocultural barriers to dietary modification that can be reduced if diabetic patients follow the Ministry of Public Health and Sanitation's guidelines (2010a, p. 17) on dietary behaviour, which recommends the following principles of diet modification for diabetic patients in Kenya: Dietary counselling by a dietician/nutritionist, caloric restriction, avoiding binge eating, and avoiding animal fats, salt, alcohol and commercial foods intended for diabetic consumers. It also recommends that people with diabetes avoid simple sugars and, instead, consume

complex carbohydrates, high-fibre foods, vegetables and a controlled number of fruits. It recommends that people with diabetes follow individualised eating plans that are based on traditional eating patterns, and consist of at least three meals that are palatable and affordable per day.

However, research indicates the majority of diabetic patients in Kenya do not follow these dietary guidelines. A study that was conducted at Thika Level 5 Hospital in central Kenya found that only 35.8% of participants followed a strict diet plan, while 44.7% did not follow any diet plan (Wamucii *et al.*, 2020, p. 34). In another study, which was conducted in central Kenya, 80% of the participants had abnormal body mass index (Wahome, Makau and Kiboi, 2018, p. 2731). This finding was associated with poor eating habits and the consumption of starchy foods in most meals. In another study that was undertaken to determine patterns of dietary adherence by diabetic patients in Kenya, 66.8% of participants said that they could afford the recommended diet, but only 22.3% of the same group of participants actually adhered to recommended diet guidelines (Musee, Omondi and Odiwuor, 2016, p. 31). Data from these studies were considered in the absence of more recent publications.

In the coastal region of Kenya, recent data shows that poverty was cited as a reason for not following recommended diet guidelines (Abdulrehman *et al.*, 2016, p. 6). In the same region, religious practices associated with Ramadhan were perceived to create good dietary restrictions during the day, although it leads to overeating in the evening (Abdulrehman *et al.*, 2016, p. 8). In addition to religious practices, this community reported finding it difficult to change family eating patterns to suit family members with diabetes. These participants also stated that it was difficult to avoid eating food provided at social gatherings, such as weddings (Abdulrehman *et al.*, 2016, p. 8).

At the time of this study, data on enablers of performance of recommended dietary guidelines in LMICs, including Kenya, was not available. Consequently, most of the barriers to dietary modification presented in the literature are anchored in the IMBP distal variables. These IMBP distal variables that were found to be barriers to following dietary guidelines are cultural factors, such as food norms, cultural dietary beliefs and practices,

and religious beliefs and practices, such as religious fasting during Ramadhan. The other cultural factor that was identified as a barrier to following dietary guidelines is individual lifestyle, that is, poor eating habits. Apart from culture, other IMBP distal variables that act as barriers to dietary modification include demographic variables, for instance economic factors, including lack of money and lack of education. IMBP individual differences that were viewed as barriers to dietary modification include individual food preferences, desire to eat what other family members are eating, and not feeling satisfied after eating recommended food portions.

In addition to dietary modification, diabetic patients are expected to *adhere to prescribed medication* to achieve optimal self-management – this will be discussed in the next section.

2.3.4 Adherence to diabetes medication

Adherence to diabetes medication is one of the crucial DSM practices stipulated in the IDF's diabetes management guidelines (2012, p. 50). The researcher was not able to identify studies investigating adherence to diabetes medication in HICs. Concerning compliance to diabetes medication regimen in LMICs, this practice was found to vary from one country to another.

A systematic review on adherence to diabetes medication in LMICs revealed that the lowest adherence rate (24.1%) was in Ethiopia, while the highest recorded compliance rate, of 96.7%, was in Iran (Al-Lela *et al.*, 2020, p. 273). The finding of this systematic review is that, in general, medication adherence is low in LMICs. In Cameroon, more than half (54.4%) of participants did not adhere to diabetes medication (Aminde *et al.*, 2019, p. 6). In Saudi Arabia, approximately 80% of the participants had suboptimal adherence to diabetes medication (Alqarni *et al.*, 2019, p. 68). In Kenya, literature indicates that drug adherence by diabetic patients is suboptimal (Masaba and Mmusi-Phetoe, 2020, p. 2074). The factors associated with poor drug adherence in Kenya include the high cost of medication, inadequate knowledge of the disease process of diabetes, inadequate

family support, the pill burden, and insufficient health messages from health care providers (Masaba and Mmusi-Phetoe, 2020, p. 2075).

The different adherence rates in different LMICs could be associated with different methods used for data collection by the different studies. The variation in drug compliance rates in different LMICs could also be linked to IMBP-related distal variables. IMBP distal variables that are seen as barriers to drug adherence include various demographic factors, such as cost of medication, low income and low education levels in different setups. A cultural factor such as inadequate family support was also perceived to be a barrier to drug adherence. The other IMBP distal variables involved in low drug adherence relate to individual differences, such as perceived side effects of drugs, the perceived pill burden and perceived inadequate health messages from the health care providers (Masaba and Mmusi-Phetoe, 2020, p. 2075; Al-Lela *et al.*, 2020, p. 273). In addition to the various factors that are seen to hinder adherence to diabetes medication and other self-management approaches, the increasing burden of diabetes is causing concern in health care globally (Abdul *et al.*, 2020, p. 107).

2.4 BURDEN OF CARE OF DIABETES AND THE ROLE OF DIABETES SELF-MANAGEMENT PRODUCTS

This section will briefly discuss the burden of diabetes care at three levels, namely global/country-level burden of diabetes care, the burden of diabetes care for individual patients and families/communities, and the burden on health care systems. This section will conclude with the role of DSM products in alleviating this burden.

Globally, diabetes imposes a huge burden on health care expenditure, with an estimated 9% of global health expenditure being allocated to diabetes management (IDF, 2021, p. 5). Similarly, diabetes is accused of imposing a catastrophically high economic burden in LMICs (Ahmed and Almulla, 2020, p. 251). This situation is compounded further by the fact that sub-Saharan Africa, where majority of the countries are classified as LMICs, receive minimal diabetes care financing from HICs (Mercer *et al.*, 2019, p. 2264). Furthermore, this region has experienced a decline in the workforce, which is attributed

to diabetes and diabetes complications (Mercer *et al.*, 2019, p. 2264). It is also evident that diabetes has a direct impact on labour market productivity in LMICs. Literature indicates that there is a significant statistical association between diabe tes and reduced outcome of employment (Pedron *et al.*, 2019, p. 3); this increases the economic burden associated with diabetes in LMICs. In Kenya, the burden of diabetes care is evident, as the cost of diabetes management is catastrophic, at 10% of annual household expenditure (Oyando *et al.*, 2019, p. 304). This implies that the high cost of diabetes care causes human suffering for patients diagnosed with diabetes, and their families.

Research indicates that, globally, diabetes has a great impact on human life – it is ranked the seventh-greatest cause of human suffering (Abdul *et al.*, 2020, p. 107). Human suffering is associated with a high prevalence of diabetes complications and comorbidities (Nuche-Berenguer and Kupfer, 2018, p. 3). Patients diagnosed with diabetes commonly experience physical, social, economic and psychological burdens and suffering (Amankwah-poku *et al.*, 2021, pp. 5–6). The physical suffering of people diagnosed with diabetes is closely linked to diabetes complications, such as irreversible diabetic retinopathy and cataracts (Maseko, Van Staden and Mbali Mhlongo, 2021, p. 1), acute cardiac disease, stroke, and renal disease (Purdy *et al.,* 2020, p. 15). Literature reports that these diabetes complications are associated with premature death (Mercer *et al.*, 2019, p. 2264). The physical burden of diabetes has a direct social and economic impact on people with diabetes and their family members.

People with diabetes often experience disruptions to their social life and sexuality, they may be separated from their spouses, lose their jobs and family income, and lose working days (Oyando *et al.*, 2019, pp. 305–306). Alongside these personal challenges, the burden of diabetes management in this context is extended to the families and friends of those diagnosed with diabetes. This is because people with diabetes often resort to lending resources from family members and friends to pay for the direct cost of their care, such as purchasing medication and for transportation to health facilities (Oyando *et al.*, 2019, p. 306). In addition to the direct costs of diabetes care in Kenya, indirect costs contribute to the economic burden imposed by diabetes. Such indirect costs include long

waiting hours at health care facilities, inability to continue working and the associated loss of income, and loss of working days/hours (Oyando *et al.*, 2019, p. 306). In addition to the social and economic burden of diabetes, people diagnosed with diabetes also experience a psychological burden, and they may suffer from psychological stress, depression and reduced health-related quality of health (Pati *et al.*, 2020, p. 3).

Apart from the physical, social and economic as well as psychological burden of diabetes, there is increased demand on already constrained health care facilities and health care providers, and health care facilities lack adequate staffing (Nuche-Berenguer and Kupfer, 2018, p. 3). In Kenya, challenges experienced in health facilities include a lack of basic equipment, such as glucometers and strips, and inadequate staff (Purdy *et al.*, 2020, pp. 15–16). According to a recent *Kenya Health Workforce Report*, the country's health workforce in hospitals, where diabetic patients ought to seek care, is not sufficient (Ministry of Health, 2015, p. 83). Furthermore, some of the staff had not undergone adequate training in managing diabetes/diabetes complications (Hussein *et al.*, 2021, p. 7). According to the *Kenya Harmonised Health Facility Assessment Report,* only 58% of diabetes care services are available at hospitals countrywide (Ministry of Health, 2019, p. 43).

From the above, it is clear that products aimed at ensuring effective DSM are required to reduce the physical, social, economic and psychological burdens experienced by people diagnosed with diabetes, their families, and the country. Moreover, it is clear that products should not add to burdens already constraining health facilities or health care providers. Therefore, the first PDR was derived. This PDR will be enlisted, together with subsequent PDRs derived from the scoping review, to enable formulation of a context-specific DSM product for Kenya.

PDR 1: A product that will enable DSM by adults in the Kenyan context could primarily be used by patients diagnosed with diabetes.

2.5 CONCLUSION

The first section of this chapter elaborated on several concepts relating to diabetes by providing a definition of diabetes, and discussing the prevalence and classification of diabetes. The second section of this chapter focused mainly on DSM in relation to corresponding IMBP distal variables as reported for people with diabetes in HICs, LMICs and the Kenyan context. The IMBP distal variables that emerged from this literature overview are the following:

- Demographic factors, such as economic factors, advanced age, and education level of diabetic patients;
- Cultural variables, such as lifestyle, religious beliefs and practices, social support and cultural beliefs/norms/values;
- Individual differences, such as individual preferences, and level of knowledge/skills of using self-care resources; and
- Environmental factors, such as availability/unavailability of resources in local settings, accessibility/inaccessibility to physical activity facilities.

The last section of this chapter focused on the burdens of diabetes care for a country, individual patients, their families, and for a health care system. In conclusion, the researcher indicated the role that could be played by a DSM product, and derived the first PDR.

In the next chapter, Chapter 3, the methodology that was applied across the three phases of the study will be discussed.

CHAPTER 3
STUDY METHODOLOGY

3.1 INTRODUCTION

In this methodology section, the researcher will discuss the research methods, population, sampling, data gathering, data analysis, ethical considerations and methodological rigor upheld across the three phases of this study (*cf.* Tables 1.1; 1.2).

The first method that will be discussed is the literature overview. The purpose of and the process that was followed in conducting the literature overview will be explained, and the ethical considerations and methodological rigor that were applied will be elaborated on. The second method that will be explained is the scoping review. The purpose of the scoping review will be explained and the stages that were followed in conducting the scoping review will be elaborated upon. The ethical considerations and methodological rigor that were applied to the scoping review will be presented. The third method that will be presented is the Kawa group discussions. The concept of the Kawa river model, and how it was adapted to this study, will be clarified, and the two steps of the Kawa river model, namely drawing of individual rivers and discussion of the rivers, will be explained. The population, sample, explorative interviews, data analysis steps and the ethical considerations and methodological rigor as they apply to the Kawa group discussions will be provided in detail. The fourth method, a survey, will be explored according to the population, sampling, data collection, analysis, ethical consideration and methodological rigor exposition.

After the discussion of the survey as method applied in this study, a brief presentation on design will be provided, showing how the prototype product and the final product were generated. Finally, the expert review as method will be presented, and the population, sampling, data collection, analysis, ethical consideration and methodological rigor will be explained. After the discussions on the methodology that was applied in this study, this chapter will end with a brief conclusion.

3.2 METHODS ACROSS PHASES

In this section, the researcher will present a detailed overview of the methods that were applied in this study, starting with the literature overview.

3.2.1 Literature overview

A narrative type of literature overview was conducted at the beginning of this study, with the aim of summarising published literature, compiling and synthesising existing knowledge and presenting a report on the existing knowledge in the field of study (Moahmmed, 2021, p. 10) The purpose of the literature overview that was conducted in this study was to present IMBP distal variables that influence DSM by adults in LMICs, as reported by other authors. The IMBP distal variables that were considered included culture, demographic variables, attitudes towards target, that is, stigma and stereotype, personality, moods and emotions, other individual differences such as perceived risks, and exposure to media and other interventions. This information formed the basis of defining the research questions for subsequent phases of this study (Moahmmed, 2021, p. 10).

3.2.1.1 Selection of articles

Selecting the articles that were included in this literature overview was done by applying the inclusion criteria listed in Table 3.1, and the implied exclusion criteria.

Table 3.1: Inclusion criteria for literature overview

Inclusion criteria	
1	Publications reporting on studies conducted in LMICs on factors influencing DSM
2	Latest editions of Kenyan and international policy documents on diabetes
3	Primary studies conducted since 2017
4	Abstracts and articles written in English

3.2.1.2 Ethical considerations

The ethical considerations that were applied to the literature overview are honesty and good stewardship (Steneck *et al.*, 2010, p. 1). Honesty was achieved in the literature overview by accurately reporting data from the selected articles. The researcher avoided altering the meaning of statements in policy documents and the findings of diabetes journal articles. Good stewardship was also observed by providing details of all policy documents and journal articles that are cited.

3.2.1.3 Methodological rigor

Methodological rigor was mainly achieved by ensuring *dependability* of the literature overview report. This was established by including selected published policy documents and journal articles. The findings of the literature overview were presented according to IMBP distal variables that influence DSM in LMICs.

3.2.2 Scoping review

A scoping review aims to rapidly map the key concepts underpinning a research area and the main resources and types of evidence available, and to map out relevant key concepts (Arksey and O'Malley, 2005, p. 21). Unlike other types of literature reviews, scoping reviews enable researchers to identify all relevant literature regardless of the study design (Arksey and O'Malley, 2005, p. 22). A scoping review is considered relevant when the researcher has an interest in identifying, discussing and reporting specific factors or concepts in research (Munn *et al.*, 2018, p. 3; Peters *et al.*, 2020, p. 2121). As such, scoping reviews provide a general overview of the available evidence of concepts in literature (Peters *et al.*, 2020, p. 2121). This scoping review was completed and information integrated in the design prior to the updated scoping review guidelines becoming available.

In this study, the purpose of doing a scoping review was to identify PDRs that were adopted as tentative indicators for DSM in LMICs. These PDRs were derived from the IMBP distal variables, which include culture, demographic variables, attitudes towards

target, that is, stigma and stereotype, personality, moods and emotions, other individual differences, such as perceived risks, and exposure to media and other interventions (Fishbein and Yzer, 2003, p. 167). The contextualisation of distal variables illustrates the flexibility and adaptability of IMBP to different cultures (Yzer, 2008, p. 25). From the categories and sub-categories identified by the scoping review, PDRs were extracted to serve as part of the guiding principles by which a context-specific product that will enhance DSM in Kenya, was designed.

3.2.2.1 Stages of the scoping review

Arksey and O'Malley's methodological framework (2005, p 22) stages that were adapted in this scoping review will be elaborated on. It is recommended that a scoping review comprises six stages, which should be applied in an iterative way, as opposed to a linear approach (Arksey and O'Malley, 2005, p. 22). In this scoping review, the first five stages of Arksey and O'Malley were used. The sixth stage, consulting with stakeholders, was not included in the scoping review, because the stakeholders, who were adults diagnosed with diabetes, health care providers and diabetes experts, were engaged in other phases of the study – that will be discussed in subsequent sections. The first five stages that were used are:

1. Identifying the research question,
2. Identifying relevant literature,
3. Selecting journal articles,
4. Charting the data, and
5. Collating, summarising and reporting the results.

These stages were applied in this study as follows.

- Stage 1: Identifying the review question

The review question is the key starting point of a scoping review (Arksey and O'Malley, 2005, p. 6), because it guides the formation of the search strategy. The review question that was used to guide this scoping review of journal articles is,

What is known from literature about distal variables influencing DSM by adults in LMICs?

This review question was broad enough, and it facilitated a wide search of journal articles (Levac, Colquhoun and O'Brien, 2010, p. 3). A review question should clearly outline the main aspects of the scoping review, such as the main concept, the study population and intended health outcomes (Levac *et al.*, 2010, p. 3). The specific aspects in this review question are illustrated in Table 3.2.

Table 3.2: Applied review with scope of enquiry

Aspects	Description of the aspects
Concept	Distal variables influencing DSM according to IMBP
Population	Adults diagnosed with diabetes in LMICs
Health outcome	DSM

Source: As proposed by Levac *et al.* (2010)

- Stage 2: Identifying relevant literature

The researcher identified the search terms and their synonyms that would be used. Search terms and their synonyms are listed in Table 3.3.

Table 3.3: Search terms and their synonyms

Search term	Synonyms
Adults with diabetes	Adults with diabetes mellitus Adults with type 2 diabetes Adults with type 2 diabetes mellitus Adult patients with diabetes Adult Patients with diabetes mellitus Diabetic adults Adult diabetic patients

Search term	Synonyms
	Adults diagnosed with diabetes
DSM	Diabetes self-care Self-governance Personal care Self-help Looking after one-self Self-administration Self-regulatory Self-managing Self-reliance Self-rule

Each of the search terms in Table 3.3 was linked to the following IMBP distal variables during the literature search:

- Culture/habit/way of life/lifestyle;
- Demographic variables, including education level, marital status, religion, age, gender, family history of diabetes and duration of illness;
- Attitudes/character/perspective/stand/view/temperament regarding on factors such as stereotypes/custom/pattern and stigma/disgrace/reproach;
- Personality/temperament/nature/make-up, moods and emotions;
- Individual difference variables, including perceived risk/risk perception; and
- Exposure to media/publishing/correspondence or other interventions.

The University of Free State's subject librarian assisted to refine the search string. The final search string that was used to guide the literature search is given in Table 3.4.

Table 3.4: Search string guiding literature search

adult* and diabet* and (self-manag* or self-care or Self-govern* or “Personal care” or Self-help or Self-administrat* or Self-regulat* or Self-relian* or Self-rule or self-monitor*) and (variable* or Cultur* or habit* or lifestyle* or demographic* or “marital status” or relig* or age or gender or stereotyp* or custom* or pattern* or stigma* or disgrace* or reproach* or personality or temperament* or mood* or emotion* or “risk perception” or media* or publish* or correspond* or interven* or psychosocial*).

Databases from the EBSCOHost platform (Academic Search Ultimate, Africa-Wide Information, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source–- Consumer Edition, Health Source: Nursing/Academic Edition, MasterFILE Premier, MEDLINE, PsycARTICLES, PsycINFO, SocINDEX with Full Text) and Scopus were searched.

- Stage 3: Selecting articles

Only journal articles were selected for this scoping review, as guided by Arksey and O’Malley (2005, p. 23). The eligibility criteria used in journal articles selection were as follows: Identified articles that *were published from 1 January 2009 to 31 December 2019* were included. This period was chosen in order to include seminal work on DSM in the past 10 years. This criterion, therefore, allowed the researcher to do a wider search of articles that discuss distal variables affecting DSM, and to capture more recent articles that would be suitable for developing a context-specific product that will enable DSM in Kenya. The second eligibility criterion that was considered is *published primary journal articles,* in order to strengthen reference to variables that influence DSM in LMICs.

Only studies c*onducted in LMICs* that are the same level or below the World Bank ranking (Fantom and Serajuddin, 2016, pp. 41–48) of Kenya were included in this scoping review. Studies conducted in high income countries were excluded by scrutinising abstracts and

full articles through manual searches. This criterion was used to derive categories and sub-categories that lead to PDRs that are context specific. These PDRs enabled the researcher to develop a context-specific product to enhance DSM in Kenya. Articles included in this scoping review are articles that relate to sample populations of *adults aged at least 18 years* who were diagnosed with diabetes. The inclusion of studies whose study populations included adults who were 18 years and above was crucial, because the researcher's main aim was to develop a product that could enhance self-management by adults diagnosed with diabetes. Articles that discussed DSM by adults were considered to be relevant, since the product of this study will be used by adult diabetes patients, irrespective of whether they had Type 1 or Type 2 diabetes.

Articles that discussed DSM by adults were considered to be relevant, since the product will be used by adult diabetes patients, irrespective of whether they had Type 1 or Type 2 diabetes.

To enable the researcher to read, understand and synthesise the content of the selected journal articles, the researcher selected *journal articles with abstracts and full articles written in English*. The studies' focus on DSM was extended to include those using mHealth and eHealth approaches to DSM. Studies depicting distal variables as identified in the IMBP (see Table 3.5) were included, thereby further aiding the identification of distal variables applicable specifically to the Kenyan context. The full list of the inclusion exclusion criteria is given in Table 3.5.

Table 3.5: Inclusion/exclusion criteria applied to scoping review

Inclusion criteria
Published 2009 to 2019
Published primary journal articles
Studies conducted in LMICs
Adults 18 years of age and above diagnosed with Type 1 or Type 2 diabetes
Abstracts and full text in English
DSM focus
mHealth and eHealth approaches that facilitate DSM
IMBP identified distal variables influencing DSM
Exclusion criteria
Secondary journal articles
Conference proceedings
Study protocols
Letters/editorials/personal comments
Focus on diabetes risk factors
Articles discussing pre-diabetes
Focus on health care provision of general diabetes management
Journal articles testing efficiency or efficacy of diabetes management devices, therapies and research study approaches
Focus on diabetes complications
Focus on diabetes interventions

By applying these inclusion/exclusion criteria, the following approach to selecting studies was used. The researcher, in collaboration with the promotors, participated in the

selection of studies across each step. The initial titles of articles that were identified from the databases, as well as the additional titles of articles from the reference lists of systematic reviews that had initially been identified in the database searches, were screened for duplicates. Although the systematic reviews did not meet the inclusion criteria (*cf.* Table 3.5), their respective reference lists were screened to avoid missing out on studies that met the inclusion/exclusion criteria. Duplicates within the same database were removed electronically, while duplicates across databases were eliminated by a manual search. After elimination of duplicates, unsuitable titles were also eliminated. The next step was to review abstracts. Abstracts that did not meet the outlined inclusion criteria were excluded. The remaining full articles were screened against the set inclusion/exclusion criteria. The full articles that met the inclusion criteria were then exposed to detailed review during data extraction. Throughout the selection process, rigorous audit trails were kept, indicating reasons for including/excluding studies.

- Stage 4: Charting data

The researcher undertook a thorough review of the selected articles and extracted relevant data. Data charting involved extracting details such as the name(s) of author(s), date, location where the studies were conducted, study design, and distal variables affecting DSM. All this information was charted on a MS Word spreadsheet. An example of data charting is as given in Table 3.6. Distal variables affecting DSM were identified. These distal variables, which formed the main categories, are anchored in the IMBP (Fishbein and Yzer, 2003, p. 167).

Table 3.6: Extract of charted data

Journal article	Year	Place study undertaken	Study design, population, sample size	Distal variables affecting DSM that were identified
Mariye, T., Tasew, H., Teklay, G., Gerensea, H. and Daba, W. (2018). Magnitude of diabetes self-care practice and associated factors among type two adult diabetic patients following at public hospitals in central zone, Tigray Region, Ethiopia, 2017. *BMC Research Notes*, 11(380), pp. 1–6. https://doi.org/10.1186/s13104-018-3489-0	2018	Central zone Ethiopia	**Study design**: Cross-sectional survey **Population**: All type 2 diabetic patients visiting public hospitals in central zone of Tigray. Sample size: 284	Culture Demographics Attitude Personality/moods/emotions Individual differences Exposure to interventions

- Stage 5: Collating, summarising and reporting the results

The information identified in the selected studies was collated, summarised and reported in detail. The discussion of the specific data that were identified and organised into categories and sub-categories will be discussed in Section A of Chapter 4. A summary of these findings and the emerging PDRs will be presented in Section B of Chapter 4.

3.2.2.2 Ethical considerations

The researcher observed ethical considerations for the scoping review by referring to ethical principles entrenched in the Singapore Statement on Research Integrity (Lucas, 2010, p. 1). *Honesty,* the first principle, was achieved by reporting data from the identified studies in an accurate manner, without distorting the meaning the authors had assigned to the data. By doing so, the researcher was able to ensure *integrity* of the reported data in this scoping review. The second ethical principle that the researcher observed in this scoping review is *accountability,* which was ensured by observing the responsibility of

research records as per the Singapore Statement on Research Integrity. In line with this responsibility, an audit trail was maintained in this scoping review. This audit trail can facilitate reproducibility by other researchers. Thirdly, the researcher observed the ethical principle of *professional courtesy and fairness*. This principle was realised by focusing on *societal considerations*, which would, at the end of the study, improve the wellbeing of adults diagnosed with diabetes in Kenya, by designing a product that will improve their diabetes condition. Fourthly, *good stewardship* was observed by ensuring sufficient in-text citation of data obtained from other authors' work and availing a detailed reference list for all work cited. *Good stewardship* was also achieved by observing methodological rigor, by following Arksey and O'Malley's framework (2005, p. 22).

3.2.2.3 Methodological rigor

The researcher followed the first five stages suggested by Arksey and O'Malley (2005) in conducting this scoping review; this was considered as the most suitable approach, because the stages are precise, and this enabled a clear methodology for the researcher. In the first stage, the researcher *identified a broad review question*, which assisted in the implementation of the second stage, which was, *identification of relevant literature*. To search for relevant literature, the researcher, with the aid of the subject librarian, developed search terms and a search string. This ensured *transferability,* as other researchers can apply the search terms and search string in other studies. With a vast list of literature, the researcher meticulously *selected the most suitable articles* in the third stage. Selecting the most suitable articles brought about *dependability* in the scoping review. By doing so, the findings were relied upon to outline the distal variables that influence DSM in the context of LMICs. The researcher then *charted data* from the selected articles in the fourth stage. The charting of data was applied to achieve *credibility* for this scoping review, by ensuring that the information from the various studies considered was consistent with the authors' meaning. Finally, the last stage, which was *collating, summarising and reporting of findings*, was done. In reporting the findings, the researcher ensured *dependability* of the findings, by keeping a record trail of all literature identified. A detailed discussion of the findings was done, to achieve *dependability* of the

scoping review findings. By summarising and reporting findings, the researcher was able to identify the distal variables that influence DSM in the context of LMICs, of which Kenya is one.

The discussion of findings of the scoping review formed the basis for deriving PDRs, which were considered as the tentative indicators of a product that will enable DSM by adults diagnosed with diabetes in Kenya (*cf.* 1.5). The PDRs that were formulated from the scoping review were concurrently considered in the analysis of data derived from the next study method, that is, a group discussion with adults diagnosed with diabetes.

3.2.3 Kawa river model

The Kawa river model uses the natural metaphor of a river to illustrate an individual's path of life (Teoh and Iwama, 2015, p. 2). The metaphorical constructs of this model were applied in this study to elicit the distal variables that affect DSM in the Kenyan context. The word "Kawa" is a Japanese word that refers to a river (Janus, 2017, p. 29). This metaphor was used in group discussions to elicit IMBP distal variables (*cf.* Figure 1.2), including culture, demographic variables, attitudes towards targets, personality/ mood/emotions, individual differences, exposure to media and exposure to interventions as they affect DSM by adults diagnosed with diabetes. The river flow metaphorically represents the flow of human life and life energy (Janus, 2017, p. 29). This concept was useful for depicting how the lives of diabetic patients' flow. In the Kawa river model, the concept of a river is used as a metaphor that references five constructs (Teoh and Iwama, 2015, p. 5) and thereby depicts human life. Table 3.7 lists the five river elements, namely, the river flow, the riverbanks, rocks, driftwood and open spaces, and what each of these elements represent in relation to living life with diabetes.

Table 3.7: Kawa river metaphor and corresponding interrelated constructs

Number	Natural river feature	Constructs of Kawa river model	Elements represented by the river constructs
1	River flow	Life flow and priorities	Smooth or turbulent life flow
2	Riverbanks	Environments/contexts, social and physical	Demographic details within the social and physical environments
3	Rocks	Obstacles and challenges	Other individual difference variables, e.g. perceived risk
4	Driftwood	Influence factors	Material or immaterial influencing factors Material influencing factors could be special equipment, such as glucometer and strips Immaterial resources could be personal attributes, values, knowledge, experience, skills and social support system
5	Space	Opportunities for enhancing flow	Exposure to media and other interventions

According to Teoh and Iwama (2015, p. 2), the *source of the river* depicts the beginning of life and the end of the river stands for death. In this study, the start of the river represented the point in time when the participant was diagnosed with diabetes, and end of the river represented the current position in their life with diabetes. The river flow metaphorically represents the flow of human life and life energy (Janus, 2017, p. 29). This concept was useful for depicting how the lives of patients diagnosed with diabetes are flowing. The flow could be smooth, or turbulent, because of the rocks or the shape of the river bottom (Janus, 2017, p. 29). River flow questions were designed to focus on the past, the present and the future of the diabetes patients' lives, their medical history, self-management and leisure activities and occupations. The patients were asked to describe whether the flow of their lives was weak or strong, where a weak flow represents constant

illness. Information derived from the river flow construct was used to form the basis for further interrogation, so that the participants could provide reasons for why the flow of their life was either strong or weak.

The river of life flows between *riverbanks*. *Riverbanks* metaphorically stand for environments or contexts, which could be social, physical, political or economic. The environment affects the river flow (Teoh and Iwama, 2015), in this case, the flow of lives of people diagnosed with diabetes. Physical environment represented where the patient lives, like home, or works. Social environment represented family, workplace, social relations and friends. The researcher derived details on how the environment enhanced or impeded the life flow of diabetes patients. In this study, study participants were asked to illustrate how demographic details within their physical and social environment affect their DSM.

Together with riverbanks, the other feature that affects the river flow is rocks. *Rocks* represent life circumstances that hinder river flow (Teoh and Iwama, 2015), challenges, obstacles and difficulties faced by diabetes patients. These rocks have different characteristics, like shape, size, colour and texture (Janus, 2017, p. 30). In this study, rocks represented problems experienced by the diabetes patients; for instance, they may represent sickness. Together with rocks, there are other *individual difference* variables, which are the perceived risks/barriers and perceived enablers. The patients represented these challenges as they perceived them in terms of their sizes, shapes or textures of stones in their rivers. Each participant had to identify the rocks that affected their DSM, to help the researcher devise a product that would be suitable to reduce or remove the rocks, where possible.

As much as rocks impede life flow, the patients had access to some personal resources that could also affect the flow of their river of life. These are referred to as driftwood. *Driftwood* represents personal influence factors, which could be either material self-care resources, or immaterial resources. Material resources are assets, such as financial resources or special equipment, like glucometer and strips. Immaterial resources are personal attributes, values, knowledge, experience, skills and a social support system

(Janus, 2017, p. 30). When these personal resources are used appropriately by the patient, DSM will be enhanced. If the personal resources are not applied appropriately, they can impede self-management. There are *spaces* between obstructions, which represent the opportunities to improve river flow (Teoh and Iwama, 2015). If these spaces are utilised appropriately, the lives of adults diagnosed with diabetes will be improved. Adults diagnosed with diabetes identified the spaces that would allow better flow of the river of life. The spaces can be enhanced by coming up with ways that can either remove or reduce the rocks, and utilise driftwood appropriately. In this study, this activity represented exposure to media and other interventions.

Findings from the semi-structured group discussions enhanced the PDRs that emerged from the scoping review, to become DRs that informed the second phase of this study (*cf.* Figure 1.5). This stage concluded Phase 1 of the study.

The steps of the Kawa river model that will be discussed in this section are drawings of participants' personal rivers, and a discussion of rivers drawn by participants.

3.2.3.1 Steps of adapted Kawa river model

Constructs of the Kawa river model were applied in this research to stimulate the thinking of adults diagnosed with diabetes, to elicit distal variables influencing DSM in Kenya, as they are anchored in the IMBP. The constructs of a river were adapted as analogies of distal variables that either enabled or hindered DSM by the study participants. The researcher applied the first two steps of Kawa river model utilisation (Wada, 2011, p. 231), as follows.

- Allowed each participant to draw their river of life (*cf.* Addendum 11), taking into consideration their circumstances; and
- Discussed the river models drawn (*cf.* Addendum 12), to clarify and comprehend the participants lives in context (Wada, 2011, p. 231).

The remaining four steps of the Kawa river model utilisation did not apply to this study, because they are tailored to therapeutic interventions. The discussion then ended with a conclusion of the findings.

Step 1: Drawing of personal river

In this first step, the researcher had an opening session with participants of each group to describe the concept of the adapted Kawa river model. The guiding statement that was posed to the participants is, *I would like each one of you to compare a river and your life from the time you were diagnosed to have diabetes until now. Draw the river of your life as a patient diagnosed with diabetes.* The researcher explained to them what each component of the river metaphor represented. The researcher demonstrated to the participants how to draw a Kawa river model from a given hypothetical scenario.

The variables to be unearthed were the IMBP distal variables that were seen to affect DSM in the Kenyan context. Distal variables can either enhance or limit a participant's ability to self-manage their diabetic condition. A limitation in the river flow was indicated by a rock and a riverbank that is rough. An enhancing variable was indicated by driftwood, smooth riverbanks and spaces within the river flow. Study participants were encouraged to ask questions for clarification and to talk to each other. This interaction was crucial for the participants to internalise the new concept before embarking on drawing their own river flows.

The study participants were given 15 minutes to draw their own rivers. Participants were encouraged to focus their attention on all possible barriers and enablers of their DSM, specifically, to avoid over-generalised projections. Appropriate drawing materials were provided to ensure that all participants started on common ground and to ensure that participation did not incur costs for participants. The researcher and two research assistants, who were graduate nurses, were available during this period to provide clarification to the participants. Both research assistants and the researcher were careful to answer only what participants asked, to clarify the concept of the technique, and not to add any inferences, or make any suggestions and thereby adversely influence the subjectivity of each participant's projection. Study participants communicated in Swahili,

which is a common language in the region. After drawing personal rivers, the second step was an open-group discussion session to clarify and comprehend participants' lives in context.

Step 2: Group discussion using Kawa river model

The researcher convened and facilitated the semi-structured group discussion where each participant presented their river. This discussion session was audio-recorded and later transcribed during data analysis. The study participants were informed about the recording prior to this session. Study participants were de-identified by making use of pseudonyms during the semi-structured group discussion, which were written on name tags that participants wore. The participants discussed the different constructs of their river flows. The discussion of different constructs did not follow a given order (Teoh and Iwama, 2015, p. 7). Discussion of one construct led to a question on another construct and vice versa. Participants and the researcher were allowed to ask elucidating questions to gain a better understanding of each participant's river.

After these two steps, the researcher concluded the session by summarising information gathered from the group discussion. The group discussions were scheduled to last a maximum of one hour.

3.2.3.2 Population

The study population consisted of two distinct county referral hospitals that provided care to patients diagnosed with diabetes These hospitals provided care to adult patients diagnosed with diabetes (N=250) every month.

3.2.3.3 Sample

Purposive sampling of adult patients diagnosed with diabetes, who were at least 18 years old, with either Type 1 or Type 2 diabetes, patients who had been diagnosed with diabetes for at least six months, and who attended either in-patient or outpatient departments at the sampled hospitals, was done. Participants were selected until saturation of data was achieved across the hospitals.

3.2.3.4 Explorative interview

An explorative interview was conducted by the researcher and two trained research assistants with five consenting adult diabetes patients at a county referral hospital that was not one of the sample. The participants adhered to inclusion criteria that had been set. These participants were given information on the aim of the study and the Kawa river model technique that was to be used in this study. The aim of this explorative interview was to determine the accuracy of the data collection process and to identify potential problem areas in the data collection approaches that would be applied, to strengthen data obtained from the main study. The explorative interview followed the same structured process in the pilot study as the process that was followed during the main data collection. This session was audio-recorded to enable the researcher to evaluate the clarity of the statement posed to participants. Following the explorative interview, it was realised that some of the participants only discussed symptoms that they had experienced as patients with diabetes. Therefore, the statement that was posed to the participants was modified from *Draw the river of your life as a patient diagnosed with diabetes,* to *I would like each one of you to compare a river and your life from the time you were diagnosed to have diabetes until now. Draw the river of your life as a patient diagnosed with diabetes.* With this modification, participants were asked to reflect on their journey as people diagnosed with diabetes, and by so doing, they were in a position to suggest distal variables affecting DSM, with symptoms being a part of the journey, but not the only aspect.

3.2.3.5 Data collection

Before data collection, the researcher obtained the required ethical approvals (*cf.* Addendum 2), and permission from institutional gatekeepers *(cf.* Addendum 3). The researcher attended training on conducting group discussions using the Kawa river model, in order to improve on proficiency of data collection. The researcher was assisted by two research assistants who were incorporated in the study as field workers for data collection. Prior to data collection, the two research assistants were trained on the adapted Kawa river model technique.

Study participants were then recruited using the following process. A health care provider introduced the researcher to the potential participants. The health care provider asked the patients if the researcher could talk to them. Adults diagnosed with diabetes were informed about the aim of the study on an individual basis using an information leaflet concerning the study (Addendum 4A). The research process was explained to the patients. After this, the researcher had obtained written consent (Addendum 5A) from participants who voluntarily agreed to participate in the study.

At the start of the semi-structured group discussions, participants were informed about the aim of the study and what was expected of them during the session and that their responses would be audio-recorded. The researcher facilitated the session in Swahili, and gave an opening statement (Addendum 6) to set the platform for the discussion. The group discussions lasted about an hour, with smaller groups completing the activity in a shorter time than larger groups. One of the research assistants assisted in taking field notes, while the second one was engaged in audio-recording the structured group discussion proceedings. At the end of each group discussion, the researcher shared a summary of factors enabling/hindering DSM as projected by the specific group, thereby allowing participants to confirm the accuracy of the summary. The researcher then requested study participants to hand over their diagrams of personal rivers. The participants were informed that the reason for collecting these diagrams was for data analysis purposes only.

3.2.3.6 Data analysis

Analysis of data that was derived from the semi-structured group discussions that were guided by Kawa river model was done using a thematic analysis approach (Braun, Clarke and Weate, 2021, p. 2). Deductive reasoning was applied to this thematic data analysis, based on the initially identified IMBP distal variables. Similar data provided by participants were grouped together to form the initial codes that were in line with IMBP distal variables. The codes that were closely related were grouped together to form the initial categories. The initial categories were refined further, by combining some and separating others in relation to the reality of the context. Finally, the identified categories were dichomatised

into the main themes. The semi-structured group discussion findings were presented in reference to the emerging themes, categories and codes, using a narrative approach.

3.2.3.7 Ethical considerations

The ethical principles originating from the Belmont Report (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, p. 9) were applied to this study, as elaborated in the following discussion. In the Kawa discussion groups, ethical principles that were employed include seeking ethical and institutional approvals, justice, beneficence and respect for persons. The researcher obtained ethical approvals from Health Sciences Research Ethics Committee of the University of Free State, the Mount Kenya University Ethics Review Board and National Commission of Science Technology and Innovations (NACOSTI), which is the umbrella ethics body in Kenya (Addenda 2A to 2C). After this, the researcher also sought permission from the county directors of Health (Addenda 3A and 3B), as well as hospital chief executive officer/medical superintendent (Addenda 3C and 3D). These ethical and institutional approvals were crucial checks for the required ethical considerations that were spelled out in the study.

The first ethical principle was *justice. Justice* was ensured by fair selection of study subjects. All study participants were selected following laid down inclusion and exclusion criteria. Only adult diabetes patients were included in the study, because the product that would be developed would benefit them in the long run. All willing adult individuals diagnosed with diabetes were given a chance to participate in the study. Justice was ensured in this study by avoiding exploitation of study participants who were involved in Kawa group discussions. Study procedures, costs and benefits were administered fairly among study participants. Transport reimbursement and refreshments were given to all participants equally. All the participants were also exposed to *beneficence* as an ethical principle.

The study design was envisioned to ensure *beneficence* to the study participants. The researcher designed this study to cause no harm to the participants. This study was

designed to elicit information that would be used to design a product that would enable DSM, and benefit the entire population of adult patients diagnosed with diabetes. The participants could directly benefit from the Kawa discussion groups, by talking about their lives as diabetes patients. This would bring to their realisation factors affecting their DSM. The researcher was prepared to refer participants who experienced psychological trauma to the counsellors at the hospitals where the study was conducted, with any cost that would be involved to be covered by the researcher. However, no such risks emerged during the execution of the study.

Alongside beneficence, the researcher also applied the principle of respect for persons in the Kawa group discussions. *Respect for persons* was articulated in this study using various approaches. Firstly, autonomy of the participants was respected by allowing adults diagnosed with diabetes who met the inclusion criteria, to choose to either participate or not participate in the study, as well as leave the study at any time. The researcher avoided using any form of inducement on the participants. The participants were informed that their travel costs would be reimbursed. The researcher reimbursed transport in monetary form to a maximum amount of Ksh 200 (ZAR 29). Study participants were informed of this reimbursement prior to the study, but not about the refreshments, as this could have served as unfair inducement to participate. Participants were also given adequate time and privacy to decide whether they wanted to participate or not.

Participants who chose to voluntarily participate in the study were asked to sign an informed consent form as it is stipulated in the Belmont Report. The informed consent was presented in English (Addendum 5A-i) and Swahili (Addendum 5A-ii). The researcher also provided an information leaflet written in English (Addendum 4A-i) and Swahili (Addendum 4A-ii), to inform the participants about the study. This was done to enable diabetes patients to understand the content in these documents. The researcher read out the information leaflet to study participants who could not read. Participants who were able to read were given the information leaflet and consent form before the group session. Study participants were allowed to voluntarily withdraw from the study at any point without any penalty or prejudice. However, none of the study participants withdrew from the study.

The last ethical consideration in relation to respect for persons in the Kawa group discussions was privacy and confidentiality. Respect of participants' privacy was achieved by de-identifying them by making use of pseudonyms during the Kawa group discussions. These pseudonyms were written on name tags for the participants to wear. Participants were assured of confidentiality. Research data collected from group discussions will be kept safely for five years. The hard copies will be safely stored in a locked cabinet while soft copies and electronic are password protected. However, anonymity was not assured, as participants took part in face-to-face discussion sessions.

3.2.3.8 Methodological rigor

In addition to the ethical considerations, the researcher also ensured methodological rigor by applying four specific aspects of trustworthiness, namely credibility, transferability, dependability and confirmability (Stahl and King, 2020, pp. 26–28). The first aspect that was considered is credibility, which was ensured in this study by providing opportunity for participants to converse in Swahili, thereby enriching the data obtained. The Kawa group discussion findings will be meticulously presented, alongside the participants' quotes, in the original Swahili version. Quotes were translated into English, with the utmost care being taken to preserve the original meaning of the participants' views. Transferability, the second aspect, was achieved by applying deductive reasoning informed by established distal variables of IMBP. The researcher categorised distal variables, as they were discussed by participants, into the existing categories of IMBP distal variables. Transferability was also observed by adapting the first two steps of application of the Kawa river model, as well as adaptation of the constructs of the river. Therefore, other researchers can apply these concepts to other populations of people diagnosed with diabetes to identify distal variables influencing DSM. The third aspect of trustworthiness that was applied in this study is dependability. Dependability was achieved by providing the participants with sufficient time to draw their rivers. During the drawing sessions, research assistants and the researcher were available to clarify possible misunderstandings. The researcher who facilitated groups received training related to Kawa group discussions and presented such group discussions in the presence of the

promotor, who confirmed the researcher's competence prior to the Kawa group discussions held as part of this study. The final aspect that was factored in this study is confirmability. The researcher ensured Kawa group discussions realised confirmability by audio-recording the participants' discussions, and taking field notes. The recorded information was very useful during data analysis, as the researcher referred to participants' own words. The researcher also clarified statements made by the participants during group discussion sessions. At the end of each group discussion session, the researcher presented a summary of the emerging distal variables as stated by the participants. By doing so, the researcher was able to confirm that the recorded distal variables were a true reflection of the participants' views.

3.2.4 Surveys

A survey is a method of conducting research by asking questions, after which results are statistically analysed and conclusions are made (Glasow, 2005, p. 2). In this section, the researcher will discuss the research method, research population, sample, pilot, data collection, data analysis, trustworthiness and ethical issues and methodological rigor that were considered during the execution of the survey. A survey was carried out to explore the practicability of using a DSM product in the Kenyan context.

This survey was conducted using a questionnaire as a data collection instrument. The questionnaire was informed by triangulation of results obtained from the scoping review and structured Kawa group discussions. The questionnaire was administered to two diabetes health care providers who did not form part of the sample. This pre-testing aimed at estimating the time participants would take to complete the questionnaire, and identify possible questions that needed clarification. The two participants indicated that it took approximately 20 minutes to complete the questionnaire, and that all questions were clearly stated.

3.2.4.1 Population

The study population that was considered for the surveys consisted of diabetes health care providers working in the two selected county referral hospitals in western and central

regions of Kenya. These two hospitals were selected to ensure ethnic representation in the views from the respondents across the country. The population was 304 health care providers. The distribution of the health care providers is illustrated Table 3.8.

Table 3.8: Distribution of diabetes health care providers across the selected hospitals

Cadre of staff	Number of staff
Nurses	175
Clinical officers	29
Doctors	21
Nutritionists/dieticians	9
Pharmacists	37
Pharmacy technologists	22
Counsellors	9
Diabetes educators	2
TOTAL	304

3.2.4.2 Sample

Because of the small study population per study site, purposive sampling was used to recruit study participants with relevant characteristics. In this regard, all the diabetes health care providers who met the inclusion criteria were invited to take part in the study. The inclusion criteria applied in selecting participants was qualified health care providers who directly offer services to adult patients diagnosed with diabetes. Consenting health care providers who were on duty at the time of the study were requested to complete the questionnaire. The sample size of health care providers who participated in the surveys is illustrated in Table 3.9. Trainee health care providers were excluded from this study,

because they were not deemed fully knowledgeable about provision of care to adult patients diagnosed with diabetes.

Table 3.9: Sample size of health care providers who participated in the survey

Cadre of health care provider	Number of health care providers who participated in the survey
Nurses	53
Clinical officers	8
Doctors	10
Nutritionists/dieticians	12
Pharmacists	12
Pharmacy technologists	4
Counsellors	3
Diabetes educators	1 (who doubled up as a counsellor)
Total	102

3.2.4.3 Pilot study

Pilot testing of the questionnaire was done on two health care providers who did not participate in the main study, but who met the same inclusion criteria as study participants. These two participants were requested to participate in the pilot survey voluntarily. The main aim of the study was explained to the participants in an information leaflet (Addendum 4B). Participants were asked to complete the questionnaire, after which they returned the completed questionnaire to the researcher. The researcher then checked on the usability of the data collection tool. No changes were made to the questionnaire after the pilot study, as the two participants agreed that the questionnaire was clear. The researcher also carried out descriptive analysis of the findings by calculating percentages

and frequencies to gauge the feasibility of analysis of results from the main study. This enabled the researcher to envision how the main data analysis would be conducted.

3.2.4.4 Data collection

Before data collection commenced, the researcher obtained ethical approval from the Health Sciences Research Ethics Committee of the University of Free State, Mount Kenya University Ethics Review board and NACOSTI (Addenda 2A to 2C). Institutional permission was also granted by the county directors of health and the hospital chief executive officer/medical superintendent (Addenda 3A, 3B, 3C and 3D). The permission documents were presented to the nurse in-charge in the outpatient diabetes clinics, medical wards, renal units, critical care units and emergency departments before commencing recruitment of study participants and data collection.

The nurse in-charge was requested to invite the diabetes health care providers for a 30-minute information session meeting at their respective places of work. In this information meeting, diabetes health care providers were informed of the purpose of the study and their role in the study. These participants were given information leaflets with detailed information about the study (*cf.* Addendum 4B).

Recruitment of study participants was done as follows. The ward/out-patient nurse in-charge introduced the researcher to the potential participants. The research process was explained to the health care providers. Those who agreed to participate in the study were requested to provide written informed consent (*cf.* Addendum 5B).

Participants were requested to refrain from indicating their names or personal file numbers on the questionnaires. Instead, the researcher used a coding system to number the questionnaires. Participants were allowed to fill in the questionnaires in their own free time. This ensured that the researcher did not interfere with the daily duties of the study participants. Because of this, participants were allowed to keep the questionnaires with them for a period of up to 24 hours. On average, each participant was expected to complete the questionnaire in 20 minutes. Participants were asked to drop the completed questionnaires in a sealed box that was placed at the office of the nurse in charge. The

researcher then collected the completed questionnaires from the sealed boxes the following day.

3.2.4.5 Data analysis

After receiving the questionnaires, the researcher performed data analysis using the following approach. The researcher validated the surveys by examining each survey received for completeness. In so doing the entire data base was examined for completeness. After this, the researcher decided how to handle completed surveys. The response rate was identified, and all data was captured on an Excel spreadsheet. The data was analysed using descriptive statistics, namely frequencies and percentages. After this, the researcher generated a report from the results. The results were also considered in deriving DRs that formed the basis for designing the DSM product.

3.2.4.6 Ethical considerations

The following ethical considerations were observed in line with the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1979, p. 4) for conducting surveys among health care providers. The ethical principles applied in the surveys included respect for persons, beneficence and justice. These principles were applied to the surveys as follows. *Respect for persons* was applied in the survey by ensuring the autonomy of the participants. Participants were allowed to choose to either participate or to not participate in the study. They were also allowed to leave the study at any time. The researcher avoided any form of inducement of participants. Participants were given the information leaflet (Addendum 4B), which aided their understanding of what was expected of them once they had decided to participate in the study. After this, they were also given adequate time to decide if they would participate or not participate in the study. Those who chose to be part of the study were asked to sign an informed consent form (Addendum 5B). None of the study participants withdrew from the study.

In addition to the aforementioned application of respect for persons, the survey participants were also accorded anonymity, and the information they provided was treated

with the utmost confidentiality. To achieve anonymity, participants were de-identified by making use of codes that were indicated on the questionnaires. They were advised not to indicate identifying data, such as names, phone number, or personal file number on the questionnaires. Furthermore, participants personally dropped the completed questionnaires in a sealed box, and the researcher only collected the completed questionnaires, without interacting with the participants. The completed questionnaires will be kept under key and lock for a period of five years.

The other ethical principle that applied to the surveys is *beneficence.* Beneficence was achieved by maximising the benefits of the study. This was realised by obtaining information on the practicability of a DSM product that will reduce over-reliance of patients diagnosed with diabetes on health care providers in the long run. The DSM product will also simplify the role of health care providers in assisting patients diagnosed with diabetes to perform sufficient self-care.

Lastly, the principle of *justice* was applied to the surveys. Justice was realised in the surveys by ensuring fair selection of study subjects in accordance with the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, p. 9). Justice was also ensured in this survey by avoiding exploitation of study participants who were involved in surveys. Study procedures, costs and benefits were administered fairly among study participants. All study participants were selected according to the inclusion/exclusion criteria. Health care providers could have been vulnerable when scrutinising the practicability of a product that is effective in the Kenyan context. To ensure protection of the study participants in line with Belmont report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979, p. 9), the rights of health care providers were protected by gaining ethical approval from NACOSTI, county directors of Health and the chief executive officers of the selected hospitals, to participate in the study.

3.2.4.7 Methodological rigor

Methodological rigor for the surveys was ensured through credibility, dependability and transferability. *Credibility* of surveys conducted among health care providers was achieved by relying on health care providers' expertise that was applied while responding to the questionnaires. Credibility was also endorsed by triangulation of results obtained from Kawa group discussions and the scoping review, in formulating the questionnaire that was administered for data collection in the surveys. In addition to credibility, rigor in the survey was observed by ensuring reliability. To achieve reliability, the research qusetionnairre was designed in accordance with IMBP distal variables derived from context-specific literature and adults diagnosed with diabetes in Kenya. Other researchers can follow the methodological rigor of developing a suitable questionnaire that befits study populations of their interest by applying the iterative process used in this study. Other researchers in similar LMICs will be able to replicate the DSR study design and the DRs that were derived from the survey data in their settings, to develop DSM products suitable for their context.

3.2.5 Design

In the first and second phases of the design science research process that was applied in this study, data identified was used to extract PDRs and DRs. These PDRs and DRs that were realised gave rise to a prototype product that was context-specific to Kenya. In designing the prototype, the researcher used the Canva graphic design application. The researcher used participants' own words to describe the content, alongside online, free, but suitable *istock* photographs. The researcher chose to use the free online photos, as they were compatible with Canva graphic design application. Other photos cannot be uploaded on Canva. The researcher then set the evaluation criteria that were adapted from the framework of Prat *et al.* (2015, p. 6). At the end of Phase 2, the output that resulted is the prototype DSM guide and the set evaluation criteria. In Phase 3, the researcher involved diabetes experts to evaluate the prototype DSM guide with reference to the set evaluation criteria. The feedback from expert reviews was considered in designing the final DSM product.

3.2.5.1 Sample

The design section was conducted by the researcher, and facilitated by the promotors.

3.2.5.2 Ethical considerations

The main ethical principle that was observed in the design methodology was integrity. While designing the prototype DSM guide, the researcher also maintained integrity by using free-to-use online photographs.

3.2.5.3 Methodological rigor

Methodological rigor in the design of the DSM guide was ensured by observing credibility and transferability. Credibility was realised by utilising the expertise of diabetes experts who reviewed the prototype DSM guide. The views of the diabetes experts were considered during the design of the final DSM guide. The researcher, furthermore, ensured credibility by using an iterative process of designing and redesigning the prototype and final DSM guide. In addition to credibility, transferability was observed in the design of a DSM guide. This was made possible by application of DSR phases with iterations between study phases.

3.2.6 Expert reviews

In this section, the study method applied to expert reviews, the study population, sampling, data collection, ethical considerations of the diabetes expert reviewers and methodological rigor will be discussed. The method that was applied in this phase was expert reviews. The aim of the expert reviews was to scrutinise the product prototype, and ensure that it was in line with DRs that emerged from the earlier phases of the study, as well as achieve the intended purpose of enabling DSM for Kenyan adults. Expert reviews were also solicited to ensure that the emerging product was in line with recommended DSR product specifications.

3.2.6.1 Population

The study population that was engaged in the expert reviews was diabetes experts, such as doctors, diabetes nurses, nutritionists and diabetes educators. Diabetes experts working in Kenya were included, to ensure the spirit of a context-specific product. An additional diabetes expert from a neighbouring East African country was considered to reinforce objective evaluation of the prototype.

3.2.6.2 Sample

Diabetes experts who were involved in the expert reviews were sampled purposively using the snowball sampling technique. In this technique, one diabetes expert referred the researcher to another expert. This sampling technique was chosen because there are very few diabetes experts in Kenya and its environs. The inclusion criterion that was applied in selection of the experts was that they should have worked in a diabetes-related field for at least five years. The researcher also selected experts who had not taken part in the survey, which was conducted in the second phase of the study, to avoid participant bias.

3.2.6.3 Pilot: Explorative interview

The researcher conducted a pilot study on two experts who were selected from the list of experts that had been identified by the health care providers. Once they were identified, an information leaflet (Addendum 4C), the prototype, and the evaluation criteria, which was designed as a DSM prototype guide evaluation form (Addendum 7), was emailed to them. The health care providers were deemed to have consented to participate in the explorative interview, as they proceeded to review the prototype. The researcher received feedback from these two experts. The practical use of the DSM guide evaluation form was assessed. The experts participating in the explorative interview indicated that the DSM guide evaluation form was properly structured. Therefore, no changes were made to the evaluation form that was developed. The data from the explorative interviews were not included in the final design of the DSM guide.

3.2.6.4 Data collection

Data collection was achieved by the use of a DSM prototype guide evaluation form (*cf.* Addendum 7) that was sent to the experts by email. The evaluation form contained a brief section on the demographics of the experts. The rest of the DSM guide evaluation form contained three sections, namely, Section A: DRs, Section B: Evaluation criteria, and Section C: General evaluation of the DSM guide. In Section A, the diabetes experts were provided with a list of the 19 DRs that had been derived through an iterative process of the first two phases of this study. Participants were asked to indicate their opinions on whether the DSM guide fully, partially or did not meet the requirements. Participants were also asked to give their inputs on how the DSM guide could be improved, in cases where they were of the view that the requirement was not met fully or not met at all. Section B in involved the evaluation criteria. This section was informed by the evaluation criteria of Prat *et al.* (2015). Diabetes experts were asked to evaluate the DSM guide prototype against the stipulated characteristics, which included goal, environment, structure, activity, and evolution (see Addendum 7). The experts gave their opinions on whether the prototype fully, partially or did not meet the set criteria. Additional space was provided for the diabetes experts to give their inputs on how the criteria that were not fully met or not met at all could be enhanced.

Finally, Section C of the evaluation form focused on a general evaluation of the prototype. In this section, diabetes experts were expected to write their general impressions on the procedure of use, the content and layout of the DSM guide. The researcher did the initial correspondence by sending the evaluation documents to the participants. Thereafter, two reminders were done telephonically. The researcher received the completed evaluation forms electronically and stored the feedback safely using a password.

3.2.6.5 Data analysis

The researcher conducted a detailed analysis of the views of the diabetes experts, as per the completed three sections of the DSM guide evaluation forms (*cf.* Addendum 7). In the first and second sections, the researcher identified the DRs and the adapted evaluation

criteria that were reported as having been fully met in the prototype DSM guide. In addition, DRs and evaluation criteria that were reported as partially or not met in the prototype DSM guide (Addendum 8) were also identified. Clarifications provided by experts as to why a DR was reported to be partially or not met, were noted. The researcher's response to expert comments was founded in literature and taking the Kenyan context into consideration. In addition to the first and second sections, the researcher also analysed the third section, which included the experts' views on the general impression of the prototype DSM guide. The views of the diabetes experts that were considered to be relevant were noted and used in the final design of the final DSM guide (Addendum 9).

3.2.6.6 Ethical considerations

The ethical principles that were embraced in the expert reviews were respect for persons, justice and beneficence. *Respect for persons* was realised by allowing voluntary participation by the experts. Participants were informed that their consent would be implied if they agreed to proceed with the review process. Therefore, no written consent was collected from the diabetes experts. Expert review participants were asked not to include their personal identification details on the feedback provided. Instead, the feedback from the reviewers was coded as Reviewer 1, 2, 3, and 4, for reference purposes. Electronic copies of feedback were password protected.

To ensure *justice,* all study subjects were selected fairly, in accordance with the inclusion criteria. The reviews were designed in a manner that the diabetes experts did not bear any financial implications. According to the principle of *beneficence*, the diabetes experts were exposed to minimal risks. None of the respondents indicated to have suffered any adverse effects following review of the DSM prototype guide. Other researchers would benefit from the DRs that were derived and used in designing and evaluating the prototype.

3.2.6.7 Methodological rigor

Methodological rigor was achieved by ensuring validity, credibility, transferability, dependability and confirmability. Validity was achieved by using DSR evaluation criteria (Prat *et al.*, 2015, p. 6) to design the evaluation criteria that was used by the experts to evaluate the prototype DSM guide.Credibility was ensured by relying on the expertise of the participants in the review of the prototype. Availing all the necessary documents, including the information leaflet, the prototype and the evaluation form, also ensures credibility of the review process. Transferability was achieved by adapting the evaluation criteria of Prat *et al.* (2015). Other DSR researchers can adapt these evaluation criteria when they check their products, by adjusting the characteristics to suit their field of study. Transferability was also achieved by evaluating the product against the set of DRs derived in the different phases of the study. Other DSR researchers can realise these DRs in evaluating products designed for their respective jurisdictions. Finally, confirmability was achieved by telephonically seeking clarification from the reviewers on responses that were not clear to the researcher.

3.3 CONCLUSION

In conclusion, Chapter 3 provided the reader with a detailed explanation of the methodology that was followed in this study. Systematically, methodological components that were adopted for the scoping review, Kawa group discussions among Kenyan adults diagnosed with diabetes, surveys administered to Kenyan diabetic health care providers, and diabetes expert reviews were presented. In the next chapter, Chapter 4, the findings of the first method, the scoping review, will be presented.

CHAPTER 4
RESULTS OF THE SCOPING REVIEW

4.1 INTRODUCTION

In this chapter, the researcher will discuss the study results of a scoping review of nine selected journal articles on DSM. Reviewing these journal articles enabled the researcher to identify seven categories and their related subcategories relating to aspects influencing DSM. The chapter will commence with a detailed discussion of the selection of the articles and presentation of the categories and subcategories, which were derived deductively from variables identified in the IMBP.

Categories are mentioned, and subcategories are discussed in detail in Section A of this chapter. Consolidating data from the different categories and subcategories enabled the researcher to formulate PDRs, which will be presented in Section B of this chapter. Section B presents a summary of scoping review results and emerging PDRs. PDRs were suggested by literature to enhance DSM, though they had to be confirmed by context-specific data generated in the next phase of the study. Some PDRs had to be changed to final DRs for the product of this study. Each of the PDRs will be presented in block format, for ease of identification. To start with, findings of article review selection will be discussed.

4.2 ARTICLE REVIEW

The detailed account of how articles were selected was explained in Chapter 3, which explained the methodology used in this study (*cf.* 3.2.2.3). In this chapter, the findings that were realised during the selection process of reports will be discussed (*cf.* Table 4.1 and Figure 4.1).

In total, 1 048 records were identified through database searches. In addition, the researcher identified an additional 76 records from reference lists of systematic reviews that had been identified by the database searches. Systematic reviews did not meet the eligibility criteria for inclusion (*cf.* Table 3.4), though their respective reference lists were

screened to ensure relevant research articles were not overlooked. In total, 1 124 initial records were identified. The researcher screened the initial 1 124 records to identify and exclude duplicates that were identified by several databases, and within the same databases. A total of 71 duplicates were eliminated from the original number of records identified, leaving a total of 1 053 records.

The remaining 1 053 records were screened by, first, by eliminating unsuitable titles (*cf.* Table 3.4); 595 titles were eliminated, which left 458 records. Secondly, 164 abstracts that did not meet the set inclusion criteria were eliminated (*cf.* Table 3.4). The researcher reviewed the remaining 294 reports against the inclusion/exclusion criteria to determine their eligibility, which lead to a further 285 reports being excluded, because the focus of these studies was not on DSM (*cf.* Figure 4.1). This left nine reports, which were included in the scoping review. This selection process is illustrated in Figure 4.1.

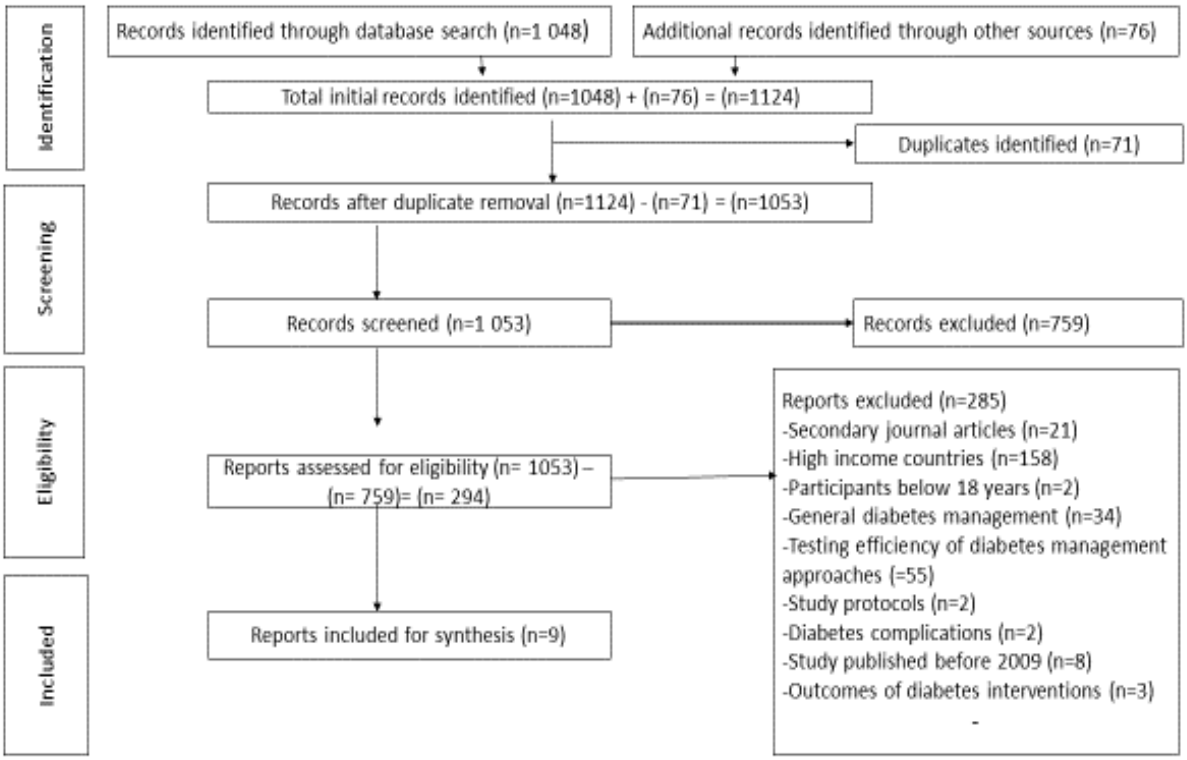

Figure 4.1: Prisma flow diagram illustrating the process of selection of journal articles

The nine articles that were selected were reviewed thoroughly and a thematic analysis of the data was performed. This analysis gave rise to seven categories, each with their related subcategories. Table 4.1 presents the seven categories of data extracted (*cf.* Addendum 10) from the scoping review, along with their subcategories.

Table 4.1: Presentation of the categories and subcategories of distal variables affecting DSM, as identified from the article reviews

Category No.	Categories	Subcategories
1	Culture	1a. Religion /religious practices 1b. Values, norms and cultural beliefs 1c. Lifestyle 1d. Language 1e. Marital status
2	Demographics	2a. Age 2b. Gender 2C. Education 2d. Socio-economic status 2e. Family history of diabetes 2g. Physical state/systemic illness 2h. Mean duration of diabetes illness
3	Attitude towards targets of DSM	3a. Attitudes towards diabetes or DSM 3b. Stigma 3c. Self-efficacy
4	Personality/mood/emotions	4a. Mental illness comorbidities 4b. Emotional influences
5	Individual differences	5a. Perceived risks/barriers/challenges 5b. Perceived benefits/enablers

Category No.	Categories	Subcategories
6	Exposure to media	6a. Exposure to social media 6b. Exposure to mass media e.g. radio, television, newspapers, internet, mobile phone applications
7	Exposure to interventions	7a. Exposure to alternative medicine 7b. Exposure to peer support groups/peer interventions 7c. Family/social support 7d. Self-care resources 7e. Diabetes education, awareness and health promotion 7f. Performing recommended self-care practices 7g. Treatment modalities 7h. Cost/infrastructure for interventions 7i. Patient/physician relationship

In the discussion in Section 4.3, each category will be presented, and subcategories discussed in detail.

4.3 SECTION A: DISCUSSION OF THE CATEGORIES OF THE ARTICLE REVIEW

In this section, the seven categories representing the findings from the scoping review will be discussed.

4.3.1 Category 1: Culture

The category of culture consists of five subcategories, namely, religion/religious practices, values/norms/cultural beliefs, lifestyle, language, and marital status. According to the data that was extracted, culture is a major IMBP distal variable affecting DSM.

4.3.1.1 Religion/religious practices

Two of the selected articles reported that the religions that were most dominant in the study populations were Hindu and Orthodox Christianity, at 86.9% and 54.1% respectively (Mohandas *et al.,* 2018, p. 10; Gurmu, Gela and Aga, 2018, p. 3). According to Bhandari and Kim (2016, p. 210), people with diabetes in Nepal believed that God would heal their diabetes; most of their religious activities focused on external activities, as opposed to inner spiritual beliefs. External spiritual activities included listening to and singing spiritual choruses, and visiting spiritual places. The researchers suggest that, in the Nepalese context, it is crucial for nurses to be aware of religious beliefs and practices, and to tailor DSM education, so that it is in line with these practices (Bhandari and Kim, 2016, p. 212).

In a study in South Africa, female participants in the township of Mfuleni attributed diabetes to either having committed sin or being bewitched (Fisher *et al.*, 2014 p. 8). Every single one of these study participants claimed that their coping abilities relied entirely on trusting God and praying, almost always or frequently. These study participants had made a habit of starting and ending all diabetes support group meetings with prayer and a song (Fisher *et al.*, 2014, pp. 8–9). The remaining seven articles did not discuss how religion affects DSM. The second subcategory in the culture category is values, norms and cultural beliefs.

4.3.1.2 Values, norms and cultural beliefs

Values, norms and cultural beliefs were mentioned in four of the nine selected articles. For example, one cultural belief, in East Delhi, India, was a myth that soaking the feet decreases blood glucose (Mohandas *et al.*, 2018, p. 108). This myth caused poor foot self-care by people with diabetes (Mohandas *et al.*, 2018, p. 108).

Other examples of cultural beliefs, norms and values were the following: In an international peer support project by Fisher *et al.* (2014, p. 8), in Cameroon, the project adopted the culturally sensitive approach of involving a friend or a family member in home visits for Muslim patients. According to a study conducted in Uganda, the majority of the

study participants believed that most foods belong to the carbohydrate category, but that meat and vegetables fall in a different food group (Baumann *et al.,* 2017, p. 6). A negative cultural value about nutrition was demonstrated by the study participants in Uganda, who claimed that they were not animals, who should eat green vegetables (Baumann *et al.,* 2017, p. 6). Mariye *et al.* (2018, p. 379) state that sociocultural variations among the participants in Ethiopia caused them to modify self-care practices to suit cultural values, norms and beliefs.

According to a study conducted in Uganda, gender-based cultural beliefs also impacted on DSM. For example, more young men than women reported experiencing sexual dysfunction (Baumann *et al.,* 2017, p. 7) and psychological problems due to their diabetic state. This can be explained by the African cultural belief that married men expect their wives to bear them children. Diabetes could have complications that affect fertility, which may lead to psychological problems in the men. Psychological problems caused by sexual dysfunction negatively affect DSM. In the same study, Ugandan women declined to remove their traditional clothing (*busuti*), which lead to errors in evaluating their waist/hip ratios (Baumann *et al.,* 2017, p. 7). This cultural belief is closely aligned to the lifestyle of Ugandan study participants.

4.3.1.3 Lifestyle

Lifestyle was found to affect DSM by five of the nine selected journal articles. According to Mohandas *et al.* (2018, p 106-107), the following are the lifestyle practices that were prevalent in adults (above 20 years) with diabetes who lived in a resettlement colony in East Delhi, India. Of these study participants, 13.6% had smoked at least once in the past week, and of the patients who smoked, six had smoked 20 cigarettes per day (Mohandas *et al.*, 2018, p. 107). The authors also found a significant relationship between smoking status and gender, employment and marital status, with smoking prevalence highest in employed, married males.

For these participants in East Delhi, India, meals were a twice-a-day, scheduled event; and adding more meals to this schedule was seen as culturally difficult to achieve

(Mohandas *et al.*, 2018, p. 107). Additionally, foods high in saturated fats were more culturally acceptable than those containing polyunsaturated fats (Mohandas *et al.*, 2018, p. 107). Regarding exercise, men claimed to lack the time to exercise, while the women were too shy to go out alone to exercise, or unless they were unaccompanied by their husbands. Finally, the authors found that few people wore shoes in the house (Mohandas *et al.*, 2018, p. 107).

In a study in Nepal, study participants reported modifying their lifestyles by finding a "new normal", by including DSM in their daily activities (Bhandari and Kim, 2016, p. 209). They achieved this through positive thinking, self-encouragement and self-control. Nepalese adults with diabetes claimed that family roles and responsibilities gave them mental peace, which enabled them to practice better self-care (Bhandari and Kim, 2016, p. 209).

In a study in Ethiopia, 56% of the study participants had made taking medication part of their lifestyles, by using daily medication reminders, like setting an alarm clock, or using meal-time habits to enhance drug adherence (Wabe, Angamo and Hussein, 2011, p. 421). These authors recommend that health care providers consider patients' daily routines when advising on drug adherence.

A study that aimed to test a peer intervention to enhance self-care by Ugandans with diabetes, found that heightened awareness by people with diabetes of lifestyle habits impacted on blood pressure and self-care (Baumann *et al.*, 2015, p. 378). Another study that was conducted in Uganda reviewed food diaries and found that the typical Ugandan diet was rich in carbohydrates, with a low intake of proteins and vitamins (Baumann *et al.*, 2017, p. 4). In this Ugandan study, some of the male participants reported smoking, over half the study participants considered daily activities as exercise, and most of them traditionally used a razor blade to trim their toenails (Baumann *et al.*, 2017, pp. 6–7). In addition to the information on the foot posters being considered unacceptable by the participants, they also struggled to understand the language used on the posters.

4.3.1.4 Language

The variable of language was mainly reported to affect research projects that involved training or the use of training materials. The authors of three studies conducted in Uganda realised that reaching study participants in their projects posed a challenge, because of the number of languages used (Baumann *et al.*, 2015, p. 381; Bauman *et al.*, 2017, p. 3; Fisher *et al.*, 2014, p. 9). For instance, in spite of Baumann *et al.* (2015, p 381) conducting their training sessions in English and Luganda, they could not reach all the participants, because of the multiple native languages/dialects spoken by the Ugandan population. According to Fisher *et al.* (2014, p 9), their project in Uganda clearly demonstrates the difficulties experienced in a setting where many languages are spoken. In this project, interpreters had to be provided for other native languages, such as Acholi and Swahili (Fisher *et al.,* 2014, p. 9). Baumann *et al.* (2017, p. 3) indicate experiencing a similar predicament in their Ugandan study.

4.3.1.5 Marital status

The influence of marital status on DSM was briefly discussed in only two of the nine selected articles. In a study that was conducted in Ethiopia, 67.3% of participants were married, and participants who were married engaged in self-care practice 3.4 times more than unmarried participants did (Gurmu *et al.,* 2018, p. 5). Women in Nand Nagri in East Delhi, India, were too shy to exercise alone, or unless they had received permission to do so or were accompanied by their husbands (Mohandas *et al.*, 2018, p. 107).

Similar to the effect of these cultural factors on DSM, demographic factors were also identified as IMBP distal variables that affected DSM. Demographic factors will be discussed next.

4.3.2 Category 2: Demographic factors

Demographic factors are discussed as a variable affecting DSM by eight of the nine selected studies. Demographic variables that were identified are age, gender, education,

socioeconomic status, family history of diabetes, physical state/systemic illness, and mean duration of diabetes illness.

4.3.2.1 Age

Three of the studies included indicate the mean age of the study participants to be 56.9, 48.3 and 53.5 years respectively (Bhandari and Kim, 2016, p. 205; Wabe *et al.*, 2011, p. 420; Baumann *et al.,* 2017, p. 3). In a study that was conducted in East Delhi, India, among people with diabetes, Mohandas *et al.* (2018, p. 105) found that 35.1% of the participants were aged 60 to 69 years. According to Gurmu *et al.* (2018, p 3), in West Shoa Zone in Ethiopia, 46.7% of the study participants were in the age bracket 40–59 years. According to Bhandari and Kim (2016, p 205), study participants who attended outpatient clinics in Nepal ranged in age from 40 to 88 years. In Uganda, the mean age of study participants who attended the public hospital, Mulago, was 51 years, while participants who attended KADIAC, a private hospital, was 58 years (Baumann *et al.,* 2017, p. 3). The age of participants was found to be related to DSM.

For instance, in East Delhi, India, patients who were younger than 50 years were much more likely to perform blood glucose monitoring than those who were older than 50 years (Mohandas *et al.*, 2018, p. 107). In contrast, a study that was conducted in West Shoa Zone, Ethiopia, participants in the age group 40–59 years had 6.35 times higher self-care practice than those who were 20 to 39 years old (Gurmu *et al.,* 2018, p. 5). Bhandari and Kim (2016, p 205) report that DSM education of adult Nepalese people with diabetes was lowest among those aged 40–50 years. They attributed this occurrence to social and familial roles and responsibilities that participants were engaged in.

4.3.2.2 Gender

Two studies, in East Delhi, India, and Uganda respectively reported on the gender distribution of their study participants, as 52.4% women, 42% men, and 58% women and 42% men (Mohandas *et al.*, 2018, p. 106: Baumann *et al.*, 2017, p. 3). There is no indication in any of the studies of how gender on its own affects DSM. However, the interesting trend that was identified by the two studies, was that more women had

diabetes than men. This could be an indication that adult women diagnosed with diabetes were more likely to access health care services for their condition than their male counterparts (Dowden *et al.*, 2019, p. 1).

4.3.2.3 Education

Mohandas *et al.* (2018, p. 106) report that the education level of participants in East Delhi, India, was low – 41.7% of them were illiterate. Similarly, the education of nearly half (47%) the participants in Uganda did not exceed primary school; furthermore, more women than men reported no education beyond primary school (Baumann *et al.,* 2017, p. 3). The majority of participants at Mulago Hospital, which is a public hospital, reported no more than primary school education, compared to participants at KADIAC private clinic, in an urban setting in Uganda, who reported to have achieved secondary school education (Baumann *et al.,* 2017, p. 4).

In a peer support programme in Uganda, English proficiency was an important inclusion criterion for participants with diabetes who were engaged in the intervention as champions. The role of these champions was to spearhead peer support interventions with other participants with diabetes, who were referred to as partners (Baumann *et al.*, 2015, p. 377). In meetings, researchers had to be sensitive about the low literacy levels of partners, and adjust their language usage. Because of low literacy levels of partners, champions read out questions to partners, and then assisted partners to record their answers (Baumann *et al.*, 2015, p. 381). Gurmu *et al.* (2018, p 5) report that, in Ethiopia, participants who attended secondary school and could read and write had 3.4 times higher self-management abilities than those with a lower education level. Education level seems to be related to the socio-economic status of people with diabetes, and socio-economic status will be discussed next.

4.3.2.4 Socio-economic status

Socio-economic status is discussed by five of the selected journal articles (Addendum 10). It is reported that participants in Central Zone in Ethiopia, and in Nepal, who had a personal source of income, or who were employed or were self-employed, reported better

self-care practices than those who had no source of income (Mariye *et al.*, 2018, p. 4; Bhandari and Kim, 2016, p 211).

According to a study conducted at Jimma University Hospital Diabetic Clinic in Ethiopia, the majority of their participants lived below the poverty line (Wabe *et al.*, 2011, p. 422). In Uganda, 71% of study participants with diabetes reported experiencing difficulties obtaining medication, because of cost or availability of medication (Baumann *et al.*, 2015, p. 381). These findings contradict the belief that people with diabetes forget to take their drugs, or stop taking medication because they feel better (Baumann *et al.*, 2015, p. 379). In Ethiopia, the average monthly cost of 32.7 birr (8.175 US dollars) was a major obstacle to diabetes medication adherence; this cost did not even include adjunct hypertension medication, which is taken by most people with diabetes (Wabe *et al.*, 2011, p. 422). Baumann *et al.* (2015, p 8) report that poverty among Ugandan adults with diabetes presents a major barrier to self-care, and that few participants could afford to take their diabetes medication consistently. These participants also faced challenges meeting costs related to transport to clinics and carrying out recommended laboratory tests (Baumann *et al.*, 2015, p. 8). In another study, conducted in Nepal, the participants reported that living with diabetes was an expensive affair, and it required of them to adjust in many areas of their lives, or give up certain aspects of their lives (Bhandari and Kim, 2016, p. 210). Financial constraints also affected the eating habits of patients in East Delhi, India, especially regarding foods like fruits and vegetables, which were sometimes prohibitively expensive (Mohandas *et al.*, 2018, p. 107). In Uganda, the majority of participants attempted to avoid fats, or to limit fat intake, though these efforts to improve their diet were negated by inadequate income to afford a suitable diet. These participants reported consuming diets high in carbohydrate, mainly *matoke* (plantain), because it was available locally (Baumann *et al.*, 2017, p. 6). Many participants in the study that was conducted in India reported poverty as the main reason why they could not afford self-monitoring resources, such as glucometers and testing strips (Mohandas *et al.*, 2018, p. 107).

Another financial aspect discussed by the articles is dependency on own funds. According to Mohandas *et al.* (2018, p. 106), 57% of study participants in East Delhi, India,

depended on their own funds for treatment. The authors report that having to rely on own funds and being diagnosed in private hospitals negatively influenced dietary self-care (Mohandas *et al.*, 2018, p. 108). Participants who paid for their treatment with their own money found it difficult to afford the recommended diet. It was also found that doctors at private hospitals in East Delhi, India, focused mainly on curative, rather than preventive care (Mohandas *et al.*, 2018, p. 108).

Although Nepalese participants with diabetes who were employed reported better self-care practices, it is also important to note that work-related factors were found to cause tension between adhering to recommended self-care behaviours and meeting work-related demands (Bhandari and Kim, 2016, p. 211). The nature of work was seen by Nepalese participants to present a barrier to self-care, specifically regarding dietary regulations and exercise. These participants prioritised work-related demands, while self-care practices had to be adjusted to fit the demands of the work environment (Bhandari and Kim, 2016, p. 211). In their recommendations, Bhandari and Kim (2016, p. 211) state that nurses in Nepal should consider the work status and the type of work of their patients when they plan the care of adults diagnosed with diabetes.

4.3.2.5 Family history of diabetes

Two studies that were conducted in Ethiopia and Uganda respectively identified study participants who had a family history of diabetes, namely 32% (Mariye *et al.*, 2018, p. 379) and 41% (Baumann *et al.,* 2017, p. 3). Although the other seven studies did not refer to family history of diabetes of the study participants, the studies by Mariye *et al.* and Baumann *et al.* report a relatively high percentage of participants with familial relations with diabetes. The data does not explain how family history affects DSM.

4.3.2.6 Physical state/systemic illness

Physical state/systemic illness was addressed by six of the nine selected articles (Addendum 10). This implies that the systemic illness/physical state of people with diabetes is a crucial factor to consider in relation to DSM. According to Mohandas *et al.* (2018, p. 106), the two most common complications of study participants in East Delhi

were eye problems, at 66.1%, and foot problems, at 65.5%. Other comorbidities identified in these participants were tuberculosis and hypothyroidism (Mohandas *et al.*, 2018, p. 106). In Ethiopia, medical problems that were associated with diabetes included hypertension (61.2%), obesity (10.8%), chronic renal failure (6%), coronary heart disease (5.3%) and dyslipidaemia (3.1%) (Wabe *et al.*, 2011, p. 420). In a study conducted in Uganda, neuropathies, such as poor vision and numbness of fingers or toes, was present in more than 75% of participants (Baumann *et al.,* 2017, p. 4); participants had a mean systolic blood pressure of 136 mmHg and mean diastolic pressure of 88 mmHg. However, Baumann *et al.* suggest that blurred vision may be due to normal changes that occur with age, which can be corrected by eye glasses – which few participants could afford. Baumann *et al.* suggest that the high number of people with diabetes who present with neuropathies could be due to late diagnosis of diabetes (Baumann *et al.,* 2017, p. 8).

On average, study participants in Uganda had a random blood glucose of 11.27 mmol/L. The body mass index of these participants was as follows: 43% had normal body mass index, 33.4% were overweight, and 18.7% were obese (Baumann *et al.,* 2017, p. 5). A further evaluation of the parameter of body mass index of Ugandan participants revealed that more women than men were obese (Baumann *et al.,* 2017, p. 5). Several studies in Uganda carried out interventions to improve the clinical state of their study participants (Baumann *et al.,* 2015; Baumann *et al.,* 2017; Fisher *et al.,* 2014). In Cameroon, a six-month peer support project that was conducted among people with diabetes resulted in a significant decrease in a) Body mass index, from 28 to 25.5, b) Systolic blood pressure, from 142 to 124.4 mmHg, and c) Diastolic blood pressure, from 84.4 to 77.7 mmHg (Fisher *et al.*, 2014, p. 7). Another gain that was achieved by this project was an increase in the number of participants with HbA1c levels below 7% – from 17% to 32% (Fisher *et al.*, 2014, p. 7).

In the study in Nepal, Bhandari and Kim (2018, p. 211) report that fatigue, weight loss, internal weakness and erectile dysfunction were some of the physical symptoms that interfered with self-management. These symptoms caused mental stress, feelings of inadequacy and anxiety. Ugandans with diabetes acknowledged that fatigue and

weakness were the most common symptoms of uncontrolled blood glucose levels (Baumann *et al.,* 2017, p. 5). In Ethiopia, only 26% of the study participants could clearly state the desired blood glucose target (Wabe *et al.*, 2011, p. 421). Ethiopian study participants who were found to have excellent or very good adherence to diabetes drugs also had better higher knowledge of the desired blood glucose level (Wabe *et al.*, 2011, p. 421).

4.3.2.7 Mean duration of diabetes illness

Three of the studies reviewed identified the mean duration of diabetes among study participants: five years in Uganda (Baumann *et al.,* 2017, p. 3), 8.7 years in Nepal (Bhandari and Kim, 2016, p. 205), and 10 years in Ethiopia (Gurmu *et al.,* 2018, p. 3). The time an individual had lived with diabetes was seen to be associated with self-management, as discussed below.

According to Gurmu *et al.* (2018, p. 5), Ethiopian participants who had lived with diabetes for more than 10 years and who had undergone secondary school education, demonstrated better self-care practices than those who had lived with diabetes for less than five years. In Nepal, diabetes duration indirectly influenced self-management via the self-efficacy route (Bhandari and Kim, 2016, p. 211), which implies that the person with diabetes learnt how to take care of their condition over the years. According to the authors, this result implies that, if self-efficacy is promoted among people newly diagnosed with diabetes, it would facilitate better self-care (Bhandari and Kim, 2016, pp. 205–206).

4.3.3 Category 3: Attitude towards targets of diabetes self-care

This category emerged with three subcategories, namely, attitudes towards diabetes or DSM, stigma, and self-efficacy.

4.3.3.1 Attitudes towards diabetes or DSM

Attitudes towards diabetes or DSM were discussed in five of the nine selected articles. Positive attitudes regarding the perceived benefits of diabetes self-care were significantly associated with good self-management by adults diagnosed with diabetes in Central Zone, Ethiopia (Mariye *et al.*, 2018, p. 5). In this study, having positive beliefs about the foreseen benefits of self-management was a valuable determinant of performing special health behaviour associated with recommended self-care practices (Mariye *et al.*, 2018, p. 5). Ethiopians with diabetes who had favourable attitudes towards perceived barriers to self-management ended up performing good self-care (Mariye *et al.*, 2018, p. 5). In contrast, unfavourable attitudes towards diabetes are likely to cause poor adherence to self-management practices (Mariye *et al.*, 2018, p. 5). For instance, participants in the study in Nepal reported that diabetes "was something that causes difficulties in everyday living" and something that "restricted you and limited your freedom" (Bhandari and Kim, 2016).

Another example of unfavourable attitudes is from the study done in Uganda, where participants reported that the greatest difficulty they encountered related to behaviour change (Baumann *et al.,* 2017, p. 6): 31% of the participants perceived behaviour change to be very difficult, while 29% said that they did not have the time to practice recommended self-care activities (Baumann *et al.,* 2017, p. 6). In the same study, diabetes was generally viewed as a serious, long-term disease that required those diagnosed with it to be physically active, observe dietary control, adhere to a medication regimen and exert some or a great deal of control over their disease. However, some of the participants in the Ugandan study confessed that they discontinued drug therapy when they started feeling better – even if they acknowledged that diabetes was a lifelong condition (Baumann *et al.,* 2017, p. 6).

Favourable results were achieved by a peer support project that was conducted in Uganda among people with diabetes. A participant testified that he was very surprised by a statement in the training booklet that read, "you are not alone with diabetes". This participant realised that he had been feeling unnecessarily isolated (Baumann *et al.*,

2015, p. 377). After implementation of this peer support programme, the study participants expressed that their care at the hypertension clinic had improved, they had acquired more knowledge, and they experienced having more energy and less pain as a result of changing their approach to DSM (Baumann *et al.*, 2015, pp. 377–380). In the final evaluation feedback of another peer support project in Uganda (Fisher *et al.*, 2014, p. 7), the participants finally perceived that the care they received from the clinic staff had improved and this new dimension could motivate them to become more engaged in their clinical care in the future. Favourable perceptions among people with diabetes about care received from health care providers is crucial in reducing stigma among this population. Stigma will be discussed in the next section.

4.3.3.2 Stigma

The only aspect of stigma that was identified by Ugandan participants is that, just like HIV and AIDS, diabetes was seen as a disease that implies one had a deficiency (Baumann *et al.,* 2017, p. 8). Stigma is not discussed at length by the selected studies. However, one issue identified by the study by Baumann *et al.* (2017) in Uganda is that people with diabetes can be stigmatised as being deficient in one way or another. Such stigma can have a negative impact on DSM.

4.3.3.3 Self-efficacy

Self-efficacy is discussed briefly in three of the selected studies (Addendum 10). In Uganda, when study participants were asked if they could make changes regarding food choices, exercise and blood glucose checking, half the participants expressed some level of doubt about being able to do so (Baumann *et al.,* 2017, p. 6). In Ethiopia, it was realised that blood glucose testing had a strong correlation with self-efficacy (Gurmu *et al.,* 2018, p. 7). This implies that, if people with diabetes have access to blood glucose meters and testing strips, then the behaviour of blood glucose monitoring would be taken up by people with diabetes. Another study, conducted in Punjab, India, suggests that, if clear and thorough explanations about treatment modalities are provided by health care providers, the sense of control of their patients in increased, and this enables patients to become

more optimistic, while eliminating ambiguity (Niazi and Rafique, 2017, p. 225). However, explanations of treatment modalities are likely to be perceived differently, depending on individuals' personalities, moods and/or emotions. This category of variations will be discussed in the next section.

4.3.4 Category 4: Personality/mood/emotion

Personality, moods and emotions, as distal variables affecting DSM, were discussed by eight of the nine selected articles. Two subcategories emerged: mental illness comorbidity and emotional influences.

4.3.4.1 Mental illness comorbidities

Mental illness, such as depression, was present in 43.2% of the participants in East Delhi, India (Mohandas *et al.*, 2018, p. 106). According to Baumann *et al.* (2015, p. 380), data illustrate the emotional burden of diabetes on participants in Uganda. Results of this study reveals that, before the peer support intervention programme, 47.8% of participants with diabetes reported that diabetes made them feel sad and depressed (Baumann *et al.*, 2015, p. 380). This percentage declined to 43.9% after the intervention. In another peer support project, in Cameroon, peer supporters provided opportunities for participants to discuss emotions, such as depression; however, participants were uncomfortable about discussing such issues with health care providers (Fisher *et al.*, 2014), and the precise effect of this intervention is not reported. In Uganda, a high percentage of people with diabetes reported feeling worried, overwhelmed and sad or depressed (Baumann *et al.,* 2017, p. 7) – this situation necessitates psychological intervention.

4.3.4.2 Emotional influences

Four of the selected articles discussed emotional influences on DSM. An example of an emotional factor that was identified as affecting self-management in East Delhi, India, is fear of needle pricks by adults with diabetes (Mohandas *et al.*, 2018, p. 107). In Ethiopia, study participants did not share their emotional feelings or concerns with health care providers (Wabe *et al.*, 2011, p. 420). Nepalese participants with diabetes reported

experiencing emotional turmoil when they had to adjust their dietary habits and exercise, but they were, nevertheless, able to adjust their lifestyles and incorporate DSM into their daily living activities (Bhandari and Kim, 2016). They claimed to do this through mechanisms such as positive thinking and self-encouragement. Nepalese people with diabetes also reported to have greater trust in medicine than in other management approaches (Bhandari and Kim, 2016).

Peer support interventions also positively impacted the emotional well-being of people with diabetes. For example, the international study that was conducted in Uganda, Thailand, South Africa and Cameroon established group and individual contacts to enhance peer support. This forum provided a chance to encourage discussion of and pay attention to emotional and motivational issues that concern DSM (Fisher *et al.*, 2014, p. 6). During the training of peer supporters by this study, the aspect of social and emotional support was one of the skills that was emphasised (Fisher *et al.*, 2014, p. 6). In Thailand, village health volunteers and the study participants were taught about self-management during a one-day camp (Fisher *et al.*, 2014, p. 6). In addition, they were given networking skills they could use to provide social and emotional support during the project (Fisher *et al.*, 2014, p. 6).

Mohandas *et al.* (2018, p. 108) report on the positive effect of fear in study participants in their study, conducted in East Delhi, India. Many young adults in India with diabetes were afraid of severe, long-term complications, which made them assume responsibility for monitoring blood glucose levels and preventing complications (Mohandas *et al.*, 2018, p. 108).

Another helpful intervention for managing emotional issues is family and social support. For instance, in Uganda, study participants reported high levels of social support from family and peers (Baumann *et al.,* 2017, p. 7). However, Bhandari and Kim (2016) report a different view on family support as per the perceptions of Nepalese participants. Although family support was viewed as a vital source of support and strength, the control other people imposed on participants, especially relating to diet, was experienced negatively by some people with diabetes (Bhandari and Kim, 2016).

Niazi and Rafique (2017, p. 225) report that, in order to improve health-related outcomes and relieve the emotional distress brought about by diabetes, it is essential that patients trust their physicians. They recommend that doctors pay more attention to emotional distress when addressing self-care activities among adults with diabetes in Punjab, India (Niazi and Rafique, 2017, p. 225).

4.3.5 Category 5: Individual differences

The individual differences that were considered were classified into two subcategories, namely, perceived risks/barriers/challenges and perceived benefits/enablers.

4.3.5.1 Perceived risks/barriers/challenges

Four of the nine articles selected discussed perceived risks/barriers/challenges that are associated with DSM. Some Nepalese participants reported an indifferent attitude towards their personal responsibility, which they viewed as a barrier to self-management, particularly in the area of time and money (Bhandari and Kim, 2016, p. 210). Family members of some of the participants with diabetes in Nepal were opposed to people with diabetes spending money and time on their self-care (Bhandari and Kim, 2016, p. 210).

Other personal barriers to self-management that were identified in adults with diabetes in Ethiopia included forgetfulness (50.2%), being too busy (16%), side effects of drugs, disappearance of diabetes symptoms, and perceived ineffectiveness of drugs (Wabe *et al.*, 2011, p. 420). In the views of these participants, factors associated with non-adherence to self-care include lack of money (37.1%), side effects of drugs (29.2%), multiple drug therapy (18.3%), perceived ineffectiveness of prescribed drugs, which leads people with diabetes to use alternative medicine (9.8%), and inaccessibility of drugs (5.6%) (Wabe *et al.*, 2011, p. 420). In a Ugandan study, the participants reported that they encountered challenges related to transportation to the clinic, and accessing medication (Baumann *et al.*, 2015, p. 382). According to Baumann *et al.* (2015, p. 7), study participants in Uganda indicated that scarcity of resources was a barrier to diabetes management; consequently, only a third of the participants managed to access dental, eye or foot check-ups by health care providers. Other challenges experienced by people

with diabetes in a separate Ugandan study were blurred vision, which could result from diabetic retinopathy or the usual aging process (Baumann *et al.*, 2015, p. 381).

The perceived risk of hypoglycemia and death was reported by researchers in patients in Uganda – participants were mostly on insulin therapy, and the treatment regimen had to be managed properly in relation to diet, physical activity and acute illness (Baumann *et al.,* 2017, p. 7).

Challenges were also experienced by researchers in implementing projects that were geared to enhance DSM. For example, in Uganda, study participants spoke a number of different languages, which made communication difficult (Baumann *et al.*, 2015, p. 7). The researchers had to translate the materials to local languages. Even after attempting to overcome the language barrier in this way, some of the study participants in Uganda could still not read (Baumann *et al.*, 2015, p. 377). In this project, participants were able to identify challenges they experienced as they took part in the project. They reported that these challenges included not talking to their peers often enough (56%), not being able to contact their peers (44%), being told what to do (31%), and having peers who were not motivated to change their behaviour (25%) (Baumann *et al.*, 2015, p. 377).

4.3.5.2 Perceived benefits/enablers

According to findings about the perceived benefits or enablers of DSM, it is evident that positive attitudes about the possible benefits of self-care for people with diabetes in Ethiopia would motivate people with diabetes to perform self-management practices (Mariye *et al.*, 2018, p. 5). Fisher *et al.* (2014, p. 10), in an article that reports on an international study, state that peer support is not just a remedy for weak health systems, nor merely a cheap alternative to providing care to resource-limited populations. They emphasise that support programmes can provide good care for all people, irrespective of their economic situations (Fisher *et al.*, 2014, p. 10). Some of the study participants in Nepal experienced great satisfaction in performing their roles and responsibilities, such as taking care of elderly members of their families, which boosted their morale and encouraged them to engage in DSM (Bhandari and Kim, 2016, p. 210).

4.3.6 Category 6: Exposure to media

In this category, exposure to social media and mass media, such as radio, TV, newspapers, internet, and mobile phone applications was considered. The results will be reported in the following subsections.

4.3.6.1 Exposure to social media

This variable is deductively derived from IMBP distal variables, although no data on social media exposure emerged from the selected articles. Considering that we are living in a digital era in which social media has great influence on a variety of aspects of life, we shall consider exploring data from the Kenyan context on how exposure to social media may affect DSM.

4.3.6.2 Exposure to mass media, e.g., radio, TV, newspapers, internet, mobile phone applications

In two of the selected studies, telephone use was combined with other approaches to provide peer support to improve DSM. In a peer support programme that was implemented in Uganda, most participants used telephones and a network of peer supporters (Baumann *et al.*, 2015, p. 377). This approach enabled Ugandans with diabetes to contact clinic staff more often than they did in the pre-intervention period. Electronic phone records show that 68% of participants made telephone contact with a peer at least once a week (Baumann *et al.*, 2015, p. 377). In an international study that was conducted by Fisher *et al.* (2014), telehealth was found to contribute to peer support; texting and telephone contacts were used by participants in Uganda and automated text prompts were used in South Africa (Fisher *et al.*, 2014, p. 5) – these measures encouraged DSM. Pairs of participants in Uganda and Thailand used mobile phones to call and text each other (Fisher *et al.*, 2014, p. 3). The nature of this project involved mobile phone texting of nutritional guides and prompts to participants, to encourage them to take a walk or engage in another form of exercise (Fisher *et al.*, 2014, p. 3). All contacts that were made were registered by a central computer. In Uganda, participants were

provided with mobile phones that were connected to a prepaid network. All parties agreed to make weekly contact with each other (Fisher *et al.*, 2014, p. 5). As a back-up mechanism, call logs were kept in booklets provided by the project. Telehealth proved to make a contribution to providing peer support to Ugandans with diabetes, which was a useful approach to improving DSM (Fisher *et al.*, 2014, p. 5). These peer support approaches exposed the participants to various interventions that could enhance DSM.

4.3.7 Category 7: Exposure to interventions

Regarding exposure to interventions, nine subcategories were identified: exposure to alternative medicine, peer support groups/peer intervention, family/social support, self-care resources, diabetes education, awareness and health promotion, performing recommended self-care practices, treatment modalities, cost/infrastructure for interventions, and health care provider/patient interaction.

4.3.7.1 Exposure to alternative medicine

None of the included studies discussed alternative medicine as a variable affecting DSM. Research on alternative medicine is limited, and no evidence was found in the nine articles reviewed for this study. Should the Kenyan context prove otherwise, a DR may be formulated in line with the IMBP distal variable on exposure to interventions.

4.3.7.2 Exposure to peer support groups/peer interventions

Six of the nine selected articles extensively discuss peer support as a major variable that affects DSM. In resource-limited settings, like Uganda, peer support can be used as an approach to achieve a type of task shifting (Baumann *et al.*, 2015, p. 280). Task shifting involves transferring services that are traditionally offered by doctors, to other health care providers, such as nurses or lay people who have been trained and have acquired the required skills (Baumann *et al.*, 2015, p. 280). Fisher *et al.* (2014) indicate that peer support interventions can be implemented in a variety of settings (Fisher *et al.*, 2014, p. 2). From the findings of the studies included in this scoping review, several designs were employed to form and run peer support groups.

In the Nepalese study, people with diabetes formed networks during morning walks that they undertook to religious temples (Bhandari and Kim, 2016, p. 208). This practice was a frequent occurrence among middle-aged Nepalese participants, because this age group had a need to feel connected to a network of other people with diabetes (Bhandari and Kim, 2016).

In Uganda, the peer support project was designed to involve adults diagnosed with diabetes. These participants were engaged in this project either as spearheading champions, or as general participants, referred to as partners (Baumann *et al.*, 2015, p. 376). Champions were selected based on their ability to read and write English. The selected champions were trained in communication skills, to enable them to provide the partners with emotional support and assistance (Baumann *et al.*, 2015, p. 376). As much as champions were initially expected to ensure engagement of participants in the Ugandan project, the implementation revealed that both champions and partners managed to initiate contacts, provide supportive communication and report knowledge gaps (Baumann *et al.*, 2015, p. 380). Some participants in the Ugandan study reported sharing resources, such as vegetables, with partners during clinic visits (Baumann *et al.*, 2015, p. 382).

Another study that describes the design of its peer support programme was done by Fisher *et al.* in three sub-Saharan African countries, and in Thailand. In all four programmes, individual and group meetings were carried out to discuss the practical dimensions of diabetes management (Fisher *et al.*, 2014, p. 5), though the designs of the projects differed from one country to the next. For instance, in Cameroon, existing social connections, like tribe or clan, profession, religion or church membership, residential areas, or sports groups were used as platforms for recruiting people with diabetes, either as peer supporters or participants (Fisher *et al.*, 2014, p. 5).

Peer supporters in Cameroon had monthly meetings with their groups to discuss self-management activities. In addition to these meetings by peer supporters and participants, there were frequent individual telephone contacts, at least three scheduled and two unscheduled visits each month to each participant (Fisher *et al.*, 2014, p. 3). Participants

also made telephone contact with peer supporters who, in turn, followed up these contacts with home visits. Over time, the distinction between peer supporters and participants in the Cameroon project disappeared and support between the peer supporters and participants became mutually beneficial (Fisher *et al.*, 2014, p. 5). Group activities, such as cooking meals together, enabled people with diabetes in Cameroon to learn new ways of making healthy and delicious meals (Fisher *et al.*, 2014, p.4), as well as have group discussions on ways of overcoming DSM barriers.

In Thailand, the design of the project was anchored on existing village health volunteers, in order to enhance the programme's sustainability (Fisher *et al.*, 2014). In Thailand, people with diabetes and volunteers were involved in developing and testing a curriculum that could direct diabetes management (Fisher *et al.*, 2014). Village health volunteers worked with health care providers in community health centres (Fisher *et al.*, 2014, p. 4). Each village health volunteer recruited three people with diabetes for the study. Study participants in Thailand attended a one-day camp, where village health volunteers and health care workers provided highlights about DSM (Fisher *et al.*, 2014). Group activities in this project comprised daily exercise activities, bi-weekly/monthly group discussions, two weekly home visits, and a group garden that was irrigated with the aid of an old bicycle, which provided opportunity for exercise (Fisher *et al.*, 2014).

In South Africa, a diabetes buddies project was designed to enhance reciprocal support among women with diabetes (Fisher *et al.*, 2014, p. 3). Group leaders developed a self-management curriculum, which was improved by soliciting the views of women with diabetes in Mfuleni township, Cape Town. These participants held weekly meetings, during which they shared meals, and discussed nutrition, exercise, and managing negative emotions. They also performed role plays during these sessions (Fisher *et al.*, 2014, p. 3). After the South African project ended, diabetes buddies continued to meet weekly, and more people became involved (Fisher *et al.*, 2014).

The other factors discussed in relation to peer support projects are general challenges encountered by people with diabetes and some researchers. In Ethiopia only 34.5% of participants were aware of the existence of a diabetes association (Mariye *et al.*, 2018, p.

3). In Thailand, political unrest, flooding and an outbreak of dengue fever posed challenges to implementing the support project (Fisher *et al.*, 2014, p. 5), though the researchers adjusted and came up with ways of keeping the project moving. Fisher *et al.* (2014, p. 9) anticipated that including peer supporters in health care provision could present a challenge, and could raise questions on the appropriateness of care delivery (Fisher *et al.*, 2014, p. 9). To avert this challenge, health care providers in Uganda, Thailand, and Cameroon made time to train peer supporters, ensured ongoing supervision, and provided supporters with incentives (Fisher *et al.*, 2014, p. 10).

In conclusion, peer support projects emerged as helpful ways of improving DSM. Active peer support could be useful to prevent people with diabetes feeling isolated (Baumann *et al.*, 2017, p. 8). A peer support programme that was implemented in Uganda improved the attendance of diabetes education meetings (Baumann *et al.*, 2015, p. 377). Those who attended the meetings reported having learnt a great deal, and also had a chance to talk to others (Baumann *et al.*, 2015, p. 377). Peer supporters who have the time and experience can provide credible and practical help in initiating and maintaining improved behaviours that are key for chronic disease management (Fisher *et al.*, 2014, p.5). Peer support was also seen to be effective in changing health practices and improving the quality of life of people with diabetes in LMICs (Fisher *et al.*, 2014, p. 8). Bhandari and Kim recommend that nurses in Nepal act as facilitators to develop formal and informal support groups and networks for people with diabetes. In order to establish effective support programmes in Uganda, Thailand, South Africa and Cameroon, it was important to establish flexible and convenient times for the participants to meet (Fisher *et al.*, 2014, p. 6).

4.3.7.3 Family/social support

Family/social support is important in DSM, four of the nine selected articles show. In Ethiopia, study participants who had better social support demonstrated 3.8 times better self-care practice than those who did not have social support (Gurmu *et al.,* 2018, p. 5). In East Delhi, general diet scores were higher for participants who had family support, than those who did not have this support. It is reported that lack of family support had a

negative effect on self-care, specifically the general diet, of people with diabetes in India (Mohandas *et al.*, 2018, p. 106). According to Bhandari and Kim (2016, p. 211), social support plays a crucial role in the lives of adults diagnosed with diabetes in Nepal. Lack of support by the spouses of female participants was a barrier to self-management by these study participants.

In a study in East Delhi study, 90.5% of participants said that they received family support in the areas where they needed support (Mohandas *et al.*, 2018, p. 106). In Uganda, over 80% of participants reported receiving a great deal of or some family support for managing diabetes (Baumann *et al.,* 2017, p. 4). Bhandari and Kim (2016, p. 208) evaluated the perceived social support of Nepalese participants. They realised that perceived social support directly affected the DSM of these participants. Male Nepalese participants who had undergone college education and who were also employed were seen to have higher levels of perceived social support (Bhandari and Kim, 2016, p. 206). Bhandari and Kim (2016, p. 211) suggest that identifying a specific unmet need might contribute to planning interventions that are sensitive to gender and literacy status of members of the Nepalese population.

4.3.7.4 Self-care resources

Self-care resources are identified as important enablers of DSM by three of the nine selected articles. In Ethiopia, possessing a glucometer at home was significantly associated with good self-management practices (Mariye *et al.*, 2018, p. 3). The Ethiopian study demonstrated that participants with glucometers at home were 3.8 times more likely to practice good self-management than those who lacked a glucometer at home (Mariye *et al.*, 2018, p. 3). However, only 15.5% of participants in Ethiopia had glucometers at home (Mariye *et al.*, 2018, p. 2). A different Ethiopian study found that 77.4% of participants did not have glucometers at home (Gurmu *et al.*, 2018, p. 3); this could have contributed to the low level of self-monitoring of blood glucose found by this study. It was also realised that, in Ethiopia, there was inadequate access to test strips (Mariye *et al.*, 2018, p. 4). In addition to glucometers, other self-care resources that were identified to enhance self-care by Ugandan people with diabetes include corrective glasses, which

made written material accessible (Baumann *et al.*, 2015, p. 380), and providing participants with bilingual self-care material, which enhanced their knowledge of self-care (Baumann *et al.*, 2015, p. 381).

4.3.7.5 Diabetes education/awareness and health promotion

In five of the nine selected articles, the authors report that diabetes education/awareness and health promotion positively influenced DSM (Mohandas *et al.*, 2018, p. 109; Mariye *et al.*, 2018, p. 4; Gurmu *et al.*, 2018, p. 5; Bhandari and Kim, 2016, 211; Wabe *et al.*, 2011, p. 422). These authors indicate that patients who had received diabetes education in East Delhi, India, Ethiopia, Uganda, and Nepal performed self-care better than those who had not. In East Delhi, India, foot care scores were higher among those who had received advice on foot care practices, than those who had not received such advice (Mohandas *et al.*, 2018, p. 107). The challenge identified by several participants in studies that were conducted in Ethiopia and Uganda is that a greater percentage of them either did not have sufficient diabetes self-care knowledge, or did not attend diabetes education sessions as expected (Wabe *et al.*, 2011; Baumann *et al.*, 2017; Mariye *et al.*, 2018).

In a Nepalese study, DSM education was the lowest among participants the 40–50 years age group, people who were illiterate or unemployed, taking oral hypoglycaemic agents, who had not been ill for long, and who had higher values of HbA1c (Bhandari and Kim, 2016).

Scarcity of training resources can also affect the diabetes education provided to patients. For example, at Mulago Hospital in Uganda, the health care providers had limited or no printed educational material to offer their patients (Baumann *et al.*, 2017, p. 7). Mohandas *et al.* (2018) state that there is a need for ongoing self-care education programmes in all hospitals in East Delhi, India, both for people with diabetes and for health care providers (Mohandas *et al.*, 2018, p. 109). Educational empowerment could be a crucial element of achieving successful self-management (Wabe *et al.*, 2011, p. 422).

Mohandas *et al.* (2018, p. 109) recommend that peripheral health care facilities in East Delhi, India, conduct regular information, education and communication activities, and

establish one-on-one counselling sessions. In their study among adults with diabetes in Ethiopia, Gurmu *et al.* (2018, p. 7) concluded that interventions involving diabetes education, and those that strengthen support systems and empower self-management, are required. Researchers of a study that was done in Punjab, India, state that the main task of physicians is to educate people with diabetes, to ensure that they are aware of all aspects of diabetes (Niazi and Rafique, 2017, p. 224).

According to Bhandari and Kim (2016, p. 211), designing diabetes education in Nepal should bear in mind the level of education of people with diabetes, so that information can be passed on clearly, irrespective of literacy level, using strategies such as pictures and diagrams. These authors also suggest that nurses ought to be aware of common religious activities and ceremonies, in order to design diabetes education in line with religious requirements (Bhandari and Kim, 2016, p. 212). Diabetes education provided to people with diabetes in Uganda should clearly state that not all diseases have distinct clinical manifestations, and that sufficient diabetes control can be achieved by monitoring blood glucose (Baumann *et al.*, 2017, p. 7). Ugandans with diabetes should also know that diabetes medication controls blood glucose levels, and does not cure the disease (Baumann *et al.*, 2017, p. 7).

The lasting effects of peer intervention, such as having knowledgeable patients, was realised by the study by Baumann *et al.* (2015, p. 381), which established a new practice at diabetes clinics – each clinic started with an hour-long education session (Baumann *et al.*, 2015, p. 382). In a follow-up evaluation of the Ugandan study, participants agreed that they remembered the education they had received on self-care, and that they were still using the printed booklets (Baumann *et al.*, 2015, pp. 381–382). Bilingual English–Luganda training booklets were developed in a Ugandan peer support project, to enable all study participants to understand the content (Fisher *et al.*, 2014, p. 4). Home visits, patient support groups and confidential counselling were found to the enhance self-management of adults diagnosed with diabetes in Ethiopia (Wabe *et al.*, 2011, p. 422).

4.3.7.6 Performing recommended self-care practices

Findings from studies that were conducted in East Delhi, India, Nepal, Ethiopia and Uganda indicate that performance of recommended self-care practices, such as adjusting the diet, performing physical activity, blood glucose monitoring, and foot care was generally low (Mohandas *et al.*, 2016; Wabe *et al.*, 2011; Baumann *et al.*, 2017; Gurmu *et al.*, 2018).

The self-care practice that was reported to be most frequently practiced in Nepal was taking medication, while the least performed was blood glucose monitoring (Bhandari and Kim, 2016, p. 211). Nepalese participants reported that they avoided foods high in carbohydrates; instead, they ate wholewheat bread and leafy green vegetables. Difficulties, such as social expectations regarding dietary intake, were experienced by these participants (Bhandari and Kim, 2016, p. 211). Female Nepalese participants struggled to regulate the amount of food they consumed.

The risk of hypoglycaemia was increased in Ugandan participants who injected themselves with insulin but did not monitor their glucose levels at home (Baumann *et al.*, 2017, p. 6). In Uganda, very few participants could identify self-care goals, such as exercising more (23.2%), making better food choices (23.2%), preventing high blood glucose (13.6%) and frequent checking of blood glucose (10.1%) (Baumann *et al.*, 2017, p. 6), nor were these participants able to identify other valid self-care goals. More men than women in Uganda reported engaging in regular physical activity (Baumann *et al.*, 2017, p. 6). Over half of these participants said that they undertook daily living activities as their form of exercise, such as walking to work (Baumann *et al.*, 2017, p. 4). Female Ugandan participants reported limiting their fat intake to a greater extent than their male counterparts did (Baumann *et al.*, 2017, p. 4).

4.3.7.7 Treatment modalities

Treatment modalities are discussed by five of the selected studies. This subcategory includes forms of treatment that patients were exposed to, as well as any routine monitoring activities performed on people with diabetes. In one of the studies that was

conducted in Ethiopia, oral hypoglycaemic agents were predominantly prescribed as either monotherapy or combined therapy (Wabe *et al.*, 2011). Less than half (41.9%) of these study participants had sufficient glycaemic control (Wabe *et al.*, 2011, p. 420). This regimen did not correspond with the recommended intensive control of blood glucose (Wabe *et al.*, 2011, p. 421).

In Uganda, the majority (90.8%) of participants were on insulin therapy alone, or on insulin in combination with an oral hypoglycaemic (Baumann *et al.,* 2017, p. 4). The practice of placing patients on insulin therapy without requiring self-monitoring of blood glucose at home was seen as posing a risk of hypoglycaemia for Ugandans with diabetes (Baumann *et al.,* 2017, p. 7). Ethiopian researchers suggest that it is necessary to ensure regular appraisal of drug prescribing and improve monitoring of patient adherence to prescribed drugs, as well as other diabetes self-care activities (Wabe *et al.*, 2011, p. 422). Health care providers in Ethiopia need to liaise with people with diabetes, so as to ensure they understand and commit themselves to the prescribed regimen (Wabe *et al.*, 2011, p. 422). It was found that people with diabetes in East Delhi, India, who were on insulin were more likely to perform self-monitoring of blood glucose than those on oral hypoglycaemic agents (Mohandas *et al.*, 2018, p. 107).

HbA1c tests were not used to assess or to monitor glycaemic control by Ethiopian study participants (Wabe *et al.*, 2011, p. 420); fasting plasma glucose level measurement had replaced this gold standard of glycaemic assessment and monitoring. In Ethiopia, the researchers did not find any results of HbA1c in the patients' health records; furthermore, they were unable to determine HbA1c levels in their study, because of lack of funds (Gurmu *et al.*, 2018, p. 7).

In Uganda, the hospital director reported that people with diabetes seldom missed their clinic appointments, and they showed the best treatment adherence, in relation to patients with other conditions, after a peer support programme (Baumann *et al.*, 2015, p. 381). Aspects of this intervention were incorporated into routine care provision, and were sustained 18 months after funding was withdrawn (Baumann *et al.*, 2015, p. 382).

4.3.7.8 Cost/infrastructure for interventions

A few studies discussed cost/infrastructure and its effects on DSM. In Ethiopia, the cost of medication was subsidised by the government (Wabe *et al.*, 2011, p. 422). The authors suggest that embracing cost reduction approaches, such as pooling procurement, prescribing good quality drugs that are cheaper, government subsidies, and collaborating with donor agencies may increase the accessibility of diabetes drugs (Wabe *et al.*, 2011, p. 422). Such strategies are likely to increase adherence to diabetes medication. In Uganda, it was reported that free insulin was provided at Mulago Hospital when supply was available; however, patients on oral hypoglycaemic agents, which are costly and not available regularly, were expected to purchase their medications (Baumann *et al.*, 2017, p. 6). This inconsistency in availability of diabetes medication was seen as a barrier to DSM.

In addition to costs related to diabetes medication, infrastructure-related factors were found to influence DSM. In Uganda, the project used funds provided by the rural diabetes clinic to build a covered porch and to fix benches. This structure was used by people with diabetes and health care providers to conduct group education sessions on DSM (Fisher *et al.*, 2014, p. 8). These education sessions attracted many people with diabetes, to the point that the space was too small, and the health care facilities were overwhelmed. Literature clearly states that the health care system in Uganda currently lacks basic resources to manage the increasing number of people with diabetes.

Lack of basic resources means that people with diabetes have to devise innovative measures to enhance their self-management. In rural Supran Buri, Thailand, people with diabetes developed an innovative community garden and used an old bicycle to run the generator that was used to irrigate this garden. These participants cycled the bicycle to power the generator and, at the same time, increase their activity levels (Fisher *et al.*, 2014, p. 4). By doing so, Thai people with diabetes managed to modify their environment to enhance their self-care practices.

4.3.7.9 Patient/physician relationship

The patient/physician relationship is a crucial variable to consider when investigating DSM. In a study conducted in Punjab, India, it was evident that patients who experienced a positive relationship with their physicians are likely to experience less diabetes-related emotional distress (Niazi and Rafique, 2017, p. 220). These authors also report that patients who had more trust in their physicians engaged in diabetes self-care to a greater extent. In Uganda, a peer support project enhanced contact between people with diabetes and the clinic nurse, involving telephone calls and clinic visits (Baumann *et al.*, 2015, p. 377). This peer support programme lead to an increase in the number of patients attending the clinic, to the point that follow-up clinics were scheduled every two months, instead of the usual one month interval (Baumann *et al.*, 2015, p. 381).

In the results of their study, conducted in Uganda, Baumann *et al.* (2015, p. 5) report that 66.4% of participants indicated that they would, as a measure of problem solving and as a coping mechanism, visit a health care provider if they believed that their blood sugar levels were high. This result points to the general view of Ugandans that the doctor is the person in authority and the decision maker (Baumann *et al.*, 2017, p. 7). Bearing in mind the scarcity of trained health care providers in Uganda, and that patients heavily rely on health care providers, this finding implies that getting accurate advice in time may be difficult (Baumann *et al.*, 2017, p. 7), and this could negatively impact DSM. According to findings in Ethiopia, only 6.5% of participants disclosed to the health care provider that they skipped taking medication (Wabe *et al.*, 2011). These participants attributed their non-disclosure to factors such as overcrowding, short consultation time, unfriendly relationships with physicians, and lack of privacy at the clinics (Wabe *et al.*, 2011, p. 420).

4.4 SECTION B: SUMMARY OF SCOPING REVIEW RESULTS AND EMERGING PRELIMINARY DESIGN REQUIREMENTS

In this section, the researcher will present a summary of the results derived from the scoping review. Integrating data in various categories and subcategories that support the same IMBP-derived variables resulted in seven findings that related to a) culture, b)

demographic factors, c) psychological/emotional factors, d) diabetes education/ awareness, e) self-care resources/infrastructure, e) support networks, and f) diabetes medical management/complication prevention. These groups of findings will serve as the basis for formulating eight PDRs for a product that will enable DSM by adults in a Kenyan context. These eight PDRs are numbered PDR 2 to PDR 9. PDR 1 was announced in Chapter 2, after being derived from the literature overview reported in that chapter (*cf.* 2.4).

4.4.1 Culture

In relation to culture, study participants who engage in religious activities, such as visiting religious sites and singing and listening to religious choruses, believed that God would heal their diabetes (Bhandari and Kim, 2016, p. 212; Fisher *et al.,* 2014, pp. 8-9). Values, norms and cultural beliefs also influenced DSM. Beliefs, such as that soaking the feet would lead to hypoglycaemia, led to poor foot self-care (Mohandas *et al.*, 2018, p. 108). In some settings, the cultural beliefs of married women meant they did not engage in exercise (Mohandas *et al.*, 2018, p. 107). Negative dietary practices related to sociocultural beliefs, for instance, those that equated consuming vegetables to animal behaviours, and categorising foods in the wrong food groups, could be a barrier to dietary lifestyle modifications (Baumann *et al.,* 2017, p. 6).

Literature reveals that some people with diabetes modified their activities of daily living to incorporate recommended DSM practices in a culturally congruent manner (Baumann *et al.,* 2017, pp. 6–7; Bhandari and Kim, 2016, p. 209). It is, therefore, recommended that nurses are aware of sociocultural beliefs and practices of people with diabetes, that nurses tailor DSM education and align it with these beliefs/practices, and present in an acceptable language (Baumann *et al*, 2017, p. 3; Bhandari and Kim, 2016, p. 212; Baumann *et al.*, 2015, p. 381; Fisher *et al.*, 2014, p. 9). The following PDR is drawn from these findings:

PDR 2: A product aimed at enabling DSM by adults in the Kenyan context could be designed to support and enhance culturally congruent DSM practices in activities of daily living.

4.4.2 Demographic factors

Sociocultural factors are closely related to demographics that influence the DSM of the participants of the included studies. Age was seen to influence self-monitoring of blood glucose – younger people with diabetes were better at performing self-monitoring of blood glucose than older patients (Mohandas *et al.*, 2018, p. 107). On the other hand, older people with diabetes reported better lifestyle modification than younger patients (Gurmu *et al.,* 2018, p. 5). Another demographic factor that influenced DSM is education level. During implementation of peer support intervention programmes, researchers considered the low literacy levels of people with diabetes, and used an acceptable language (Baumann *et al.*, 2015, p. 381). DSM practices improved over time, as people with diabetes who had lived with the disease for long time, developed higher levels of self-care (Gurmu *et al.,* 2018, p. 5). The following PDR is drawn from these findings:

PDR 3: A product that will enable DSM by adults in the Kenyan context could be responsive to age, literacy levels and time living with diabetes.

Education level is closely associated with the socioeconomic status of individuals with diabetes. Concerning reports on the socioeconomic status of people with diabetes by the presented literature, participants who had a source of income reported better self-care than those who had no source of income (Mariye *et al.*, 2018, p. 4; Baumann *et al*, 2017, p. 6; Bhandari and Kim, 2016, p 211). Although people with diabetes who were employed reported better self-care, some perceived employment to be a barrier to DSM. Employed people with diabetes reported that they prioritised work-related demands, while adjusting self-care practices to fit the work environment (Bhandari and Kim, 2016, p. 211).

On the other hand, the absence of a source of income pushed people with diabetes into poverty. The negative impact of a lack of income and poverty on DSM was compounded by the high cost of medication, self-care resources and healthy food (Wabe *et al.*, 2011,

p. 422; Baumann *et al.*, 2015, p. 381; Mohandas *et al.*, 2018, p. 107). DSM of people with diabetes who relied on their own funds for diabetes care services, and those who attended private health facilities, was suboptimal (Mohandas *et al.,* 2018, pp. 106–108). In line with these findings, some of the authors of the included studies recommend that nurses consider the work status and nature of the work of people with diabetes when they planned care for adults with diabetes (Bhandari and Kim, 2016, p. 211).

PDR 4: A product that will enable DSM by adults in the Kenyan context could be designed to be sensitive and responsive to financial demands and constraints that impact on effective DSM.

4.4.3 Psychological/emotional factors

Positive attitudes, such as favourable perceptions about the benefits of self-management, and perceived DSM barriers, were indicated as enablers of DSM in some of the presented literature (Mariye *et al.*, 2018, p. 5). To the contrary, unfavourable attitudes about diabetes and diabetes management were seen to be barriers to DSM (Mariye *et al.*, 2018, p. 5; Baumann *et al*, 2017, p. 6; Bhandari and Kim, 2016, p. 211). Trust in physicians was identified by one of the articles as a factor that could help to reduce diabetes-related distress, and improve DSM (Niazi and Rafique, 2017, p. 225).

The presented literature reports that some patients with diabetes were stigmatised by people in their communities as being deficient in one way or another, and this was seen as a barrier to DSM (Baumann *et al.,* 2017, p. 8). To improve DSM practices, it is crucial that health care providers pay attention to emotional distress when planning self-care activities for adult people with diabetes (Niazi and Rafique, 2017, p. 225). Support network interventions, such as peer support and family/social support, are reported to improve attitudes towards diabetes, and to motivate DSM (Gurmu *et al.,* 2018, p. 5; Baumann *et al.,* 2017, p. 8; Baumann *et al.*, 2015, p. 377; Fisher *et al.*, 2014, p.5380) . The following PDR is drawn from these findings:

PDR 5: A product that may enable DSM for adults in the Kenyan context could be designed to identify emotional distress and reinforce approaches that can improve positive attitudes towards diabetes and its management.

4.4.4 Diabetes education/awareness

Diabetes education and awareness emerged as a crucial enabler of DSM in the reviewed literature (Mariye *et al.,* 2018; Gurmu *et al.,* 2018; Baumann *et al.,* 2017; Bhandari and Kim, 2016; Wabe *et al.*, 2011).The requirements for effective diabetes education in the selected studies include an education programme that is commensurate with the educational/literacy levels of the patients, in line with religious expectations, clear about disease progression, and includes the rationale for drug therapy (Niazi and Rafique, 2017, p. 224; Baumann *et al.,* 2017, p. 7; Bhandari and Kim, 2016, p. 211–212). The presented literature also suggests that diabetes education should be offered using appropriate educational materials, which are written in an acceptable language (Baumann *et al.*, 2015, p. 381), and which form part of peer support interventions (Baumann *et al.*, 2015, p. 377). The following PDR is drawn from these findings:

PDR 6: A product that will enable DSM for adults in the Kenyan context could be designed to promote accessible diabetes awareness, diabetes education and diabetes management.

4.4.5 Self-care resources/infrastructure

During diabetes education sessions, using self-care resources and available infrastructure should be emphasised. Possession of self-care resources, such as glucometers, corrective glasses and bilingual self-care materials, was identified as an enabler of self-care practices (Mariye *et al.*, 2018, p. 3; Baumann *et al.*, 2015, p. 380). However, in the selected literature it was evident that the majority of participants with diabetes did not own such self-care resources, owing to the cost involved (Mariye *et al.*, 2018, p. 2; Gurmu *et al.,* 2018, p. 3). Authors of some of the included studies concluded that embracing cost reduction approaches could enable people with diabetes to own self-

care resources and improve their DSM practices (Wabe *et al.*, 2011, p. 422). It was also evident that better health care facilities would encourage more people with diabetes to attend diabetes education activities (Fisher *et al.*, 2014, p. 8). Lack of sufficient DSM resources triggered people with diabetes to innovatively modify locally available resources to enhance their self-care (Fisher *et al.*, 2014, p. 4). The following PDR is drawn from these findings:

PDR 7: A product that will enable DSM by adults in the Kenyan context could seek to promote access to, and innovative utilisation of locally available self-care resources and health care facilities.

4.4.6 Support networks

The literature reports that peer support group activities that people with diabetes engaged in included individual and group meetings, where the participants shared skills on how to improve dietary practices and exercise and how to manage emotional challenges (Fisher *et al.*, 2014, pp.4–5). Regular telephone contact was found to improve communication and encourage peer support interventions (Fisher *et al.*, 2014, p. 3). Health care providers are reported to enhance peer support networks by acting as facilitators of formal and informal networks, and by undertaking a supervisory role in the peer support activities (Bhandari and Kim, 2016, p. 211). However, in some instances, a shortage of health care providers meant people with diabetes did not receive sufficient advice on performing self-care activities (Baumann *et al.,* 2017, p. 7).

Another support network that improved DSM was the family/social support network (Gurmu *et al.,* 2018, p. 5; Mohandas *et al.*, 2018, p. 106; Bhandari and Kim, 2016, p. 208). Studies report that, among the social support networks that enhanced DSM were village health volunteers, who implemented support programmes and created a link between health care providers and the people with diabetes (Fisher *et al.*, 2014, p. 4). The following PDR is drawn from these findings:

PDR 8: A product that will enable DSM by adults by the Kenyan context could be designed to align with existing and/or emerging support programmes and may include a communication strategy that is not dependent solely on input by health care providers.

4.4.7 Diabetes medical management/complication prevention

The last finding that was identified is medical management of diabetes and complication prevention. Some of the medical regimens that were prescribed by physicians did not correspond with the recommended intensive control of blood glucose (Wabe *et al.*, 2011, p. 421). Therefore, many people with diabetes who were recommended such regimens experienced uncontrolled glycaemic levels, which are associated with diabetes complications such as hypertension, neuropathies, chronic renal failure, and eye problems (Mohandas *et al.,* 2018, p. 106; Baumann *et al.,* 2017, p. 4; Wabe *et al.*, 2011, p. 420). Physical states such as diabetes-related weakness, weight loss, and erectile dysfunction interfered with DSM (Bhandari and Kim, 2018, p. 211).

In order to control these complications, the authors of some of the studies recommend conducting regular appraisals of drug prescription protocols, and monitoring compliance of drug and other self-care practices (Wabe *et al.*, 2011, p. 422). It was also indicated that health care providers should offer clear explanations of treatment modalities (Niazi and Rafique, 2017, p. 225), should involve people with diabetes in treatment plans, and encourage peer support amongst people with diabetes. By doing so, people with diabetes are likely to reduce over-reliance on health care providers and develop decision-making skills that could enhance DSM. The following PDR was drawn from these findings:

PDR 9: A product that will enable DSM by adults in the Kenyan context could be designed to improve patient-centred medical management of diabetes, while delaying/controlling the onset and progression of diabetes complications.

4.5 CONCLUSION

Chapter 4 started with an introduction, and then described the approach used to select articles for this scoping review. The rest of this chapter was a discussion in two sections.

In Section A (see 4.3), categories were presented, and their concomitant subcategories were discussed in detail. Section B (see 4.4) presented a brief summary of IMBP distal variables that influence DSM. This section concluded with a list of a further eight PDRs that will be evaluated against contextual data in Chapter 5, to determine their suitability for inclusion in final DRs for the product of this study.

In the next chapter, Chapter 5, the results of semi-structured Kawa group discussions provide context-specific data to inform the design of a product that will enable DSM by adults in the Kenyan context.

CHAPTER 5
RESULTS OF KAWA INTERVIEWS

5.1 INTRODUCTION

In this chapter, the researcher will discuss the findings of group discussions that applied the Kawa river model and that were conducted with adult diabetic participants in Kenya (Teoh and Iwama, 2015, p. 6). The Kawa river model technique was used to stimulate the thinking of study participants, to assist them to reflect on their lives in the context of having diabetes. The researcher used this technique to gather data on enablers and barriers to DSM from the lived experiences of the participants.

Study participants were asked to draw their rivers (*cf.* Addendum 11) to illustrate their journey, from the time they were diagnosed with diabetes, up to the present day. The question posed to them was, what things enable or hinder your river from flowing? Analysis of the data from the Kawa river models of the participants revealed two main themes, namely, *Enablers of effective DSM*, and *Barriers to effective DSM*. In general, four and five categories emerged under the theme of Enablers of effective DSM and Barriers to effective DSM respectively. These categories, and their concomitant codes, are illustrated in Table 5.1.

Table 5.1: Presentation of themes, categories and codes emerging from Kawa group discussions

Themes	Categories	Codes
1. Enablers of effective DSM	1.1 Economic determinants enabling DSM	1.1.1 NHIF helps me finance my diabetes management
	1.2 Dietary factors enabling DSM	1.2.1 Healthy food choices improve the nutritional status of diabetic patients 1.2.2 Home food availability enables compliance with recommended diet

Themes	Categories	Codes
	1.3 Support networks enabling DSM	1.3.1 Family/social support plays a key role in DSM 1.3.2 Peer support enhances DSM 1.3.3 Support from hospital/health care providers enhances DSM
	1.4 Emotional and attitudinal influences enabling DSM	1.4.1 Emotional resilience and effective stress management improves DSM
2. Barriers to effective DSM	2.1 Economic determinants hindering DSM	2.1.1 Unemployment/lack of money hinders DSM 2.1.2 Out-of-pocket payment complicates DSM 2.1.3 High cost of diabetes management restricts DSM options 2.1.4 NHIF premiums hinder effective diabetes management
	2.2 Dietary factors hindering DSM	2.2.1 Food shortage causes non-compliance to dietary recommendations
	2.3 Support networks hindering DSM	2.3.1 Perceived lack of family/social support is a barrier to DSM 2.3.2 Shortage of health care providers/supplies and lack of self-care resources hinder DSM.
	2.4 Emotional barriers hinder DSM	2.4.1 Stress interferes with DSM 2.4.2 Fears related to diabetes and its management hinder DSM
	2.5 Health/physical status hindering DSM	2.5.1 Diabetes complications and comorbidities lead to inadequate DSM

In the following section, Theme 1, Enablers of effective DSM, will be presented. Each of the four categories forming Theme 1 will be presented by offering a clarifying definition of each. Following this, each code pertaining to the category will be discussed in detail. This means that each code will be presented and defined, and verbatim quotes by participants will be given, as evidence from the group discussions in support of the code that was specifically mentioned by participants; metaphors from their river drawings will also be

presented (*cf.* Addendum 12 and 13). Each of the verbatim quotes will be assigned to pseudonyms representing participants. The pseudonyms have two components, for example, NAN1 or K1. The alphabetical component denotes the study site e.g., NAN or K. The numerical component of the pseudonym identifies participants chronologically. Each code concludes with an interpretation of the findings, based on their relation to similar, contrary or additional findings from literature. Theme 2, Barriers of effective DSM, follows the same pattern of presentation, discussion and interpretation. The chapter concludes with a summary of the KAWA group discussion findings, which lead to the extraction of six DRs.

5.2 THEME 1: ENABLERS OF EFFECTIVE DSM

The first theme that emerged from the semi-structured Kawa group discussions is Enablers of effective DSM. Enablers of effective DSM refer to factors that enhance the capability of people with diabetes to effectively engage in managing their own condition according to existing recommendations (Adu *et al.*, 2019, p. 2). Four categories emerged to support this theme (*cf.* Table 5.1), namely,

- Emotional and attitudinal influences enabling DSM
- Dietary factors enabling DSM
- Support networks enabling DSM
- Economic determinants enabling DSM

In Category 1.1, Economic determinants enabling DSM, only one code, *NHIF helps me finance my diabetes management*, emerged as an enabler of DSM.

5.2.1 Category 1.1: Economic determinants enabling effective DSM

Discussions on economic determinants that enable effective DSM referred to the role of the National Hospital Insurance Fund (NHIF) in financing health care services for Kenyans. In the case of DSM, the NHIF helped patients finance their overall diabetes management.

5.2.1.1 Code 1.1.1: NHIF helps me finance my diabetes management

The NHIF is a public health care financier that is endorsed by Act 255 of the laws of Kenya (National Council for Law, 2012, pp. N14-7). The functions of NHIF include receiving premium payments from all subscribed Kenyans and making payments to approved hospitals for services offered to paid-up members (National Council for Law, 2012, p. NH 14-7). The NHIF is a mandatory insurance scheme for all employed Kenyans, whose premiums are deducted from their monthly salaries. The NHIF has members who are not employed, but joined the scheme voluntarily and pay a monthly flat-rate premium of Ksh 500 (Barasa, Rogo *et al.*, 2018, p. 347). The NHIF covers certain costs incurred for medical conditions, including diabetes.

Participants of this study who were registered members of the NHIF mentioned that this fund played a significant role in helping them to access health care services that enhanced their self-management. The participants stated that the NHIF assisted them by paying up hospital consultation fees, and helping them access some drugs. The following are some of the patient quotes about NHIF assistance:

> *Swahili: NHIF, inatulipia pesa za clinic na dawa wakati zinapatikana, hio ndio maana Napata usaidizi kutoka upande mwingine.*
> *English: We receive help from the NHIF who caters for the consultation fee and drugs, when they are available in the hospital (NAN10).*

> *Swahili: Mimi natumikia NHIF ambayo inanisaidia kulipa clinic ya ugonjwa wa sukari.*
> *English: I'm registered with NHIF that pays for the diabetic clinic costs (K3).*

The participants also acknowledged that the NHIF facilitates payment of costs incurred after hospital admission, and for specialised care, such as dialysis for people with diabetes who experience renal failure complications.

> *Swahili: Ndio, mimi nililazwa katika hospitali, na nilitumiazaidi ya shilingi 200,000, na lilipa hio yote? NHIF, je hio si msaada mkubwa? Sasa niko*

katika DIALYSIS, naenda mara mbili kwa wiki, mara mbili kwa wiki ni shilingi 19, 000, mimi huwa silipi, inalipwa na NHIF, fikiria kwa mwaka mzima hiyo ni pesa kiasi gani? Kwa hivyo ni muhimu, muhimu sana na watu hawafai kuona hii kama utani, la. Shilingi 500 ni pesa kidogo sana kwa mwezi.

English: Yes, I was admitted in hospital, and I spent over 200 000 Ksh, all paid by NHIF, isn't that great support? Currently I'm on dialysis twice a week, which costs 19 000 KSh, that is paid by NHIF. How much money would it cost in an entire year? So it is very, very important to register with NHIF, and this should not be taken lightly (NAN5).

Some of the participants used metaphors, such as *trees,* in their rivers (NAN10, 16 and 27) to refer to the assistance they received from the NHIF. Participant K3 used the metaphor of a *well flowing river* to imply that her life was flowing well, because the NHIF assisted her to pay for health care services that enabled self-management. NAN21 stated that the NHIF was like *a place of crossing over the river.* This indicates that people with diabetes who were enabled to attend clinics received advice on how they could enhance self-management by modifying their lifestyles and "cross over" the problem of diabetes in their lives.

These results concur with research conducted elsewhere, where reducing the financial burden of diabetes management was considered to be an effective DSM enabler (Adu *et al.*, 2019, p. 2). In Ghana, research found that the National Health Insurance Scheme reduced the financial burden of health care, including diabetes care (Okoroh *et al.*, 2018, p. 11). In order to increase uptake of health care services offered to people with diabetes in LMICs, Mercer *et al.* (2019, p. 2270) propose using innovative financing approaches. In this respect, Kenya has put in place measures to achieve Sustainable Development Goal No. 3 (Ministry of Development and Planning, 2017, p. 24), by establishing social insurance cover for all Kenyans. The NHIF is an innovative approach that is directed at achieving universal health coverage while reducing the financial burden of diseases such as diabetes (Ministry of Development and Planning, 2017, p. 25). Implementing the NHIF

in the Kenyan health system has the goal of reducing user fees and, by so doing, providing better access to health care services to a greater number of patients, including those diagnosed with diabetes (Barasa, Maina and Ravishankar, 2017, p. 11). The success of this endeavour is vividly demonstrated by the feedback obtained in the Kawa discussions of this study.

5.2.2 Category 1.2: Dietary factors enabling DSM

The second category that was part of the first theme relates to Dietary factors enabling DSM. The participants' discussion of dietary practices revealed two factors that were seen to enable dietary modification. These are *healthy food choices improve nutritional status of people with diabetes,* and *home food availability enables compliance to recommended diet.*

5.2.2.1 Code 1.2.1: Healthy food choices improve the nutritional status of people with diabetes in Kenya

Healthy food choices refers to choosing foods that are low in saturated fats, salt and added sugars (Centers for Disease Control and Prevention, 2018, p. 6). Healthy food choices comprise non-starchy vegetables, whole grains, lean meat and low-fat dairy (Centers for Disease Control and Prevention, 2018, p. 7). In this study, only three participants acknowledged that they made healthy food choices, such as fruits, vegetables, fish, chicken, wholewheat bread and millet.

> *Swahili: Na pia najaribu kukula vyakula ambayo nimefunzwa na daktari kwa clinic ili kudhibiti sukari yangu.*
> *English: So as to control my blood sugar, I try to eat healthy food as advised by the doctor (NAN22).*

> *Swahili: Unajua tunaambiwa tukule nyama ya samakii au … kuku. Kwa hivyo mimi najaribu kutafuta chakula ile daktari anasema tukule.*
> *English: The doctors advise us to take white meat, such as fish and chicken. I try to follow this advice (NAN24).*

Swahili: Tunatakiwa kutumia wimbi, ambayo haina sukari.
English: We are supposed to eat foods that are low in sugar, such as finger millet (K3).

Participants K3 and NAN24 illustrated the concept of choosing healthy foods by drawing *fish in their rivers*. NAN24 explained that the fish in his river meant "*getting* and *using proper food".*

Healthy food choices were also mentioned by people with diabetes in Ethiopia, who indicated that they consumed grains and non-starchy vegetables as part of their diet (Ketema *et al.*, 2020, p. 7). Dietary habits that people with diabetes in Kenya practiced, according to a study by Musee *et al.* (2016, p. 31), included using cooking oil instead of cooking fat, reducing salt intake, eating fruits at all meals and eating foods with low glycaemic index, such as whole grains. Like in the current study, healthy food choices were associated with glycaemic control and preventing diabetes complications.

Although making proper food choices is an enabling factor for recommended dietary modifications, only three of the participants were keen to bring out this concept in their Kawas. This could imply that the majority of the participants did not consider choosing a healthy diet to be a crucial component of their DSM (*cf.* 5.3.2). A similar occurrence was found in Nigerian study participants, whose dietary choices consisted of highly refined carbohydrates and high-glycaemic-index foods, such as wheat products (Olatona *et al.*, 2019, p. 98). These participants reported that their intake of high-fibre foods, such as roots and tubers, was minimal (Olatona *et al.*, 2019, p. 94). These findings correspond with results of a study that was conducted in Kenya, which revealed that people with diabetes relied on high-carbohydrates meals (Wahome *et al.*, 2018, p. 2731).

5.2.2.2 Code 1.2.2: Home food availability enables compliance with recommended dietary practices

In the current study, the discussion about eating healthy foods revealed the second code related to the availability of food. Home food availability refers to presence of healthy food in the diabetic patient's home environment (McAtee *et al.*, 2020, p. 1). The majority of the

participants mentioned that they obtained food from their farms, which enabled them to follow the recommended diet. The participants reported planting a variety of foods at their farms, as indicated by the statements below.

> *Swahili: Kitu ingine mimi napanda maindi, mihogo, ndizi. Hii chakula inanisaidia, na pia napanda miti kama avocado, paipai kwa shamba langu ndio nipate matunda ya kutosha.*
> *English: Something else is that I plant maize, cassava, bananas. This food helps me. I also I plant fruit trees like avocado, pawpaw in my farm to get enough fruits in my diet (K3).*

> *Swahili: Hii miti ni chakula ninapata kwa shamba yangu. Nikipata chakula kwa shamba yangu Napata chakula chakula vizuri.*
> *English: These trees represent the food I get from my farm, which helps me to get sufficient food (NAN2).*

One participant stated that when they did not have money to buy food, they relied on food provided by their farm:

> *Swahili: Chakula nimepanda kwa shamba yangu inanisaidia, na chakula. Kama sina pesa naweza kutafuta chakula kwa shamba yangu.*
> *English: When I do not have money, I can get food from my farm (NAN24).*

NAN5 stated that his wife was involved in farming, and this meant the family was supplied with food from their farm:

> *Swahili: Mimi Napata chakula kutoka kwa shamba langu. Bibi yangu analima.*
> *English: I get food from my farm, my wife does farming (NAN5).*

The Kawa metaphors drawn by participants included *fish,* to represent recommended diet, *plants/trees,* which represented the crops planted at the farms, and animals, such as *cows at the middle of the river*.

These findings are confirmed by other studies, which found that household gardens and local cultivation of vegetables and fruits helped people with diabetes to access fresh fruits and vegetables, which would otherwise be costly to buy at the market (Ravi, Kumar and Gopichandran, 2018, p. 6). In a study in Uganda, the majority of the diabetic participants indicated that they grew food in their own gardens (Auma *et al.*, 2020, p. 8), just like the Kenyan participants in this study. Doing so enabled Ugandan participants with diabetes who lived in rural settings to eat fresh foods, such as vegetables, fruits, roots and tubers. In turn, Ugandan participants who had diabetes and who lived in urban areas supplemented their food from other sources, such as food markets (Auma *et al.*, 2020, p. 8).

Home food availability is a crucial factor that can influence dietary practices of people with diabetes (McAte*e et al.,* 2020, p. 1) and it is, therefore, one of the predictors of dietary modification. However, this is an area that needs to be explored further. It is necessary to determine if people with diabetes who rely on food from their household gardens do have sufficient supply of food varieties to enable them to acquire all necessary nutrients. The discussion about home food availability also revealed the role of family members in home food production. The third category, in the next section, will refer to the role of family and other support networks enabling effective DSM.

5.2.3 Category 1.3: Support networks enabling DSM

Support network refers to “a group of people who provide emotional and practical help to someone in serious difficulty” (Cambridge English Dictionary, 2021). The support networks that emerged as enablers of DSM for people with diabetes in Kenya include family/social support, peer support, health care providers’ support and infrastructure/self-care resources. These enabling support networks made up the three codes that form this category, with the first code being *family/social support plays a key role in DSM.*

5.2.3.1 Code 1.3.1: Family/social support plays a key role in DSM

Family support is an aspect of social support that refers to provision of assistance to others (APA Dictionary of Psychology, 2021). Family/social support emerged as a crucial

enabler of DSM in Kenya. The study participants stated that family members assisted them to find means of transport to the clinic/hospital and to prepare recommended meals, and provided financial support that enabled them to buy food and medication.

> *Swahili: Nilipata hiyo miti midogo ikinishikilia, na hao ni wana wangu ambao walianza kunigharamia na pesa za kununua dawa.*
> *English: These small trees represent the support from my children, who fund me to buy medication (NAN6).*

> *Swahili: Watoto walikuwa wanamsaidia kupika chakula inayotakikana.*
> *English: The children were helping her [wife] to prepare recommended meals (NAN7).*

> *Swahili: Nilipata hiyo miti midogo ikinishikilia, na hao ni wana wangu ambao walianza kunigharamia na pesa za kununua dawa.*
> *English: I got support from my children, who took the responsibility to buy for me medication, and this is likened to supporting myself on these little trees (NAN6).*

Other support received from family members included moral support, and assistance with activities of daily living.

> *Swahili: Hii sasa ni miti mzuri sana imememema huku kando ya mto, inamaanisha, vile mume wangu amenisaidia, amesimama na mimi, nikiwa na wasiwasi ananambia niwache kuwa na wasiwasi kwa sababu maisha itaendelea, ananisaidia hata kununua dawa. Amenielewa kabisa, na ananisaidia.*
> *English: The beautiful trees by the river side refer to the help I get from my husband. He has stood with me, he tells me to not to be worried, because life must go on. He also assists me to buy medication, and he really understands me (NAN27).*

> *Swahili: Huyu mtoto … Ehhhh, unajua haka ni kasichana kangu ka pili. Huyu mtoto ananisaidia sana. Anaisaidia na kuniongelesha, ananiambia*

mam usikufe na stress wakati baba yake anakuwa mkali kwangu, ananileta huku saa ingine. Kama niko na stress yeye ndio ananiongelesha.
English: This is my second born daughter who helps me a lot. When her father becomes harsh, she advises me not to be stressed up. Right now she called me to find out if my clinic is over so that she can buy me tea. She has been of great help to me (NAN 24).

Swahili: Kwa hivyo familia inamfanyia zile vitu ambazo yeye hawezi kujifanyia mwenyewe.
English: So, the family members help her to do those things she cannot do by herself (NAN 16 Informant).

One of the groups unanimously agreed that family members of diabetic people should be included in education sessions, so that they are in a position to assist people with diabetes with their self-management.

Swahili: Pia kwa sababu hii shida inaathiri maisha ya kila siku ni vizuru kwa wake na waume zetu ama pia wanafamilia wetu wahusishwe katika vikao vya elimu pamojaa na sisi kama wagonjwa.
English: Because this problem affects our daily living, it would be good for our spouses or our family members could be involved in education sessions together with us as patients with diabetes (NAN4).

Swahili: Ndio, ndio, ndio, madaktari wanafaa kusisitiza kwa hiyo, ndio, ndio, ni ukweli (Wote kwa jumla)
English: Yes, yes, yes, doctors should emphasise on that [educating family members], yes, yes, it is true (group consensus).

Some of the participants illustrated the help they received from family members by drawing *trees in their rivers (K1, NAN3, NAN6, NAN16)*. Other participants (K2, NAN7, NAN27) emphasised that help from family members was like *big, nice trees*. The participants categorically stated that help from family members assisted *their rivers to*

flow well. One participant (K2) viewed the *stones in her river as reducing in size,* because of the help she received from her family.

These results are similar to those realised by researchers in other LMICs, who found that family support was crucial to enhancing self-care behaviours (Ravi *et al.*, 2018, p. 8; Gurmu *et al.,* 2018, p. 5). Literature also reveals that people with diabetes in some African countries rely on family support for dietary management, and financial support to purchase medication (Suglo and Evans, 2020, p.13; Akyoo *et al.*, 2019, p. 35374). It was also clear that people with Type 2 diabetes who received support from friends and family in Zimbabwe were happier than those who did not receive such support (Mwila, Bwembya and Jacobs, 2019, p. 3). In addition to reporting on support received from family members, the study participants expressed their views on support received from their peers, which will be reported in Section 5.2.3.2.

5.2.3.2 Code 1.3.2 Peer support enhances DSM

Peer support is defined as the informal help that people with similar experiences can provide to one another in a reciprocal relationship, to overcome shared difficulties (Penney, 2018, p. 1). Discussion of peer support illuminated that some of the participants had joined peer support groups, while others were aware of the existence of such groups, though they had not joined them. One of the participants alluded to health care providers encouraging people with diabetes to join support groups.

> *Swahili: Mimi najua kuna kikundi cha usaidizi hapa katika hospitali, wao hupata kila Alhamisi ya pili ya mwezi.*
> *English: I know there is a support group that meets here at the hospital chapel every second Thursday of the month (NAN17).*

> *Swahili: Mimi najua sisi huhudhuria kila wakati hivi vikundi na.*
> *English: I know we always attend the groups with (NAN13, NAN11, NAN12, NAN15, NAN16, and NAN14).*

Swahili: Sasa hapo nyumbani Makunga, hao daktari wanatuambia tuanze kujiunga pamoja kama watu walio na shida ya sukari.
English: Those doctors in our village told us to join a group for people who have diabetes (K1).

Participants who belonged to peer support groups were enabled to perform self-care activities, such as blood glucose and blood pressure monitoring, as well as participate in peer education/counselling.

Swahili: Huwa tunapima sukari yetu

English: We usually measure each other's' blood glucose (K1).

Swahili: Tukikutana huwa tunapima sukari, shinikizo la damu, na ijiwa mtu ana swali tunamsaidia.

English: When we meet we check our sugars, blood pressure and if someone has a question we try to help him (NAN14).

Swahili: Kikundi hiki kilinisaidia sana kwa ushauri na jinsi ya kupata lishe bora, ili kusawazisha sukari yangu.

English: It (peer support) helped me with a lot of counselling and how I can eat properly so that I can balance my sugar (NAN6).

Only one participant (NAN25) used the metaphor of *trees* at the side of the river to refer to peer support. The rest of the participants did not use any metaphors in their rivers. In this code, the information that was derived from the participants who did not have metaphors emerged from the verbal discussions on peer support.

These results indicate that peer support was perceived to be an enabler of DSM. This finding is supported by literature. A systematic review that was aimed at synthesising literature available on face-to-face models for adults with Type 2 a diabetes in LMICs revealed that, when people with diabetes act as peer supporters, DSM by the participants is likely to improve (Pienaar and Reid, 2020, p. 8). In Mali, a structured peer-led DSM education intervention enhanced participants' levels of knowledge and caused certain

behavioural changes that affected the quality of their diets (Debussche *et al.*, 2018, p. 8). This peer-led support intervention also increased the potential of identifying people with diabetes complications (Debussche *et al.*, 2018, p. 9) during peer support sessions. Similarly, implementation of a peer-led support group in Western Kenya saw a great improvement in glycaemic status and self-care among the participants (Park *et al.*, 2015, p. e110). In addition to peer support, the study participants reported that the support they received from health care providers/hospitals enabled them to care for themselves.

5.2.3.3 Code 1.3.3: Support from hospital/health care providers enhances DSM

The participants appreciated the assistance they received from the health care providers, which took the form of health education and counselling. Health education refers to ‘’approaches used to inform people about health issues and persuade and enable them to adopt lifestyle that the educator believes will improve health and reject habits regarded as harmful*”* (Law, 2021). In turn, counselling is defined as “professional assistance in coping with personal problems such as behavioral and emotional problems” (APA Dictionary of Psychology, 2021). The participants reiterated that doctors/health care providers helped them to learn how to enhance their DSM behavioural practices.

> *Swahili: wakati tunapokuja hapa kwenye kliniki mimi nasaidiwa sana kujua kuhusu chakula. Hio ndio maana sukari yangu ni nzuri, mimi mto wangu unatiririka vizuri, ndio.*
> *English: When we visit the clinic, I’m assisted a lot to learn about food, that is why my sugar is good, because that doctor will teach me proper diet, and so my sugar is well controlled (NAN1).*

> *Swahili: Sasa kwa clinic wanafundisha kujipima sukari kila mara*
> *English: At the clinic, we are taught how to check our blood sugar often (K3).*

Swahili: Na pia clinic ya daktari, walinifundisha ati nitakula nini, na kunipatia dawa
English: At the doctor's clinic I was taught about diet as well as given medication (NAN21).

NAN9 and NAN24 indicated that health care providers support improved their *rivers*:

Swahili: Hapo mbele nikikuja kwa clinic maji yangu inaendelea vizuri, hawa madaktari wananisaidia sana kutufundisha vile nitajiangalia. Sasa ndio inakuwa afadhali.
English: As I attended the clinic my river flow improved. I received help from the doctors who taught me on self-care. That is the reason my river became better (NAN24).

Swahili: Ile wakati nilianza kukuja kwenye kliniki, nilisaidiwa sana, huyo daktari alinifunza jinsi ya kula halafu nikaona safari yangu ikianza kuwa bora.
English: When I started attending the clinic, the doctor taught me about diet, and my journey with diabetes became better (NAN9).

One of the participants (NAN21) referred to help received from health care providers as *a bridge* that helped her to navigate her river of life. Another participant (K3) compared the help he received from health care providers to *"trees by the riverside"*.

The participants viewed health education/counselling that they received from health care providers as an important factor in improving their self-management and health outcomes. DSM is seen as a crucial concept for keeping diabetes under control (Bonger *et al.,* 2018, p. 1). People with diabetes can engage in self-management if they have the capability to do so (Ministry of Public Health and Sanitation, 2010c, p. 52). This self-management capability is greatly enhanced when DSM education and counselling is availed to patients.

People with diabetes in Ethiopia and Dhaka, Bangladesh, indicated that they received sufficient support from health care providers (Hailu, Moen and Hjortdahl, 2019, p. 2497;

Siddique *et al.*, 2017, p. 6). In contrast, a systematic review conducted in sub-Saharan countries (Cambodia, Uganda and Kenya), found that people diagnosed with diabetes did not receive adequate support from hospitals and health care providers (Martyn-nemeth *et al.,* 2020, p. 10; Nang *et al.,* 2019, p. 7; Zimmermann *et al.*, 2018, p. 10; Kavinguha, 2017, p. 61).

The following category represents the emotional and attitudinal influences that enable DSM for Kenyan participants in this study.

5.2.4 Category 1.4: Emotional and attitudinal influences enabling DSM

One code emerged under the category of Emotional and attitudinal influences enabling DSM, namely *Emotional resilience/effective stress management improves DSM*.

5.2.4.1 Code 1.4.1 Emotional resilience/effective stress management improves DSM

The term resilience is defined as 'the critical strength that helps individuals overcome chronic disease' (Myun *et al.*, 2018, p. 798). In this study, we refer to emotional resilience as the emotional adaptability of people with diabetes that enables them to overcome the diabetes-related challenges they experience, to enhance the lifestyle changes that support DSM. Emotional resilience goes hand in hand with effective stress management. Stress management refers to the use of specific strategies to deal with stress that is experienced in difficult situations (APA Dictionary of Psychology, 2021). In this study, effective stress management refers to the use of different strategies by participants with diabetes to successfully manage psychological stress caused by diabetes, and its management.

The majority of the participants stated that religious activities, such as church teachings, praying and singing religious songs were their main mode of managing stress. Participants reported that, through these activities, they would find solutions to the stressful situations and could continue managing their condition.

Swahili: Kwa kanisa tunakuwa na mafundisho ya kutusaidia tusikuwe na stress.
English: In our church we receive teachings that help us not to be stressed (K2).

Swahili: Sasa kufika hapa ilienda vizuri kwenye mteremko, kwa sababu ya maombi na NHIF, eeh.
English: Moving on my river became better on a down-ward trend, because of prayers and NHIF (NAN12).

Swahili: Katika nyakati kama hizi wakati mimi nina shida kwa kawaida mimi huomba ama naiweka maisha kuwa huru, ndio ili nione kama angalau sukari itakuja chini
English: During such times when I'm troubled I usually pray or I take it easy I an attempt to lower my blood sugar and reduce my stress level (NAN20).

Swahili: Ndio mimi humwomba Mungu ili niweze kupunguza dhiki.
English: I reduce stress by praying to God (NAN18).

Swahili: Hiyo ni kanisa, wakati mawimbi inakuwa mingi naenda kanisani kuomba, na hiyo inasaidia akili inatulia tu.
English: That is a church. When the storms are too many, I go to church to pray and that helps my mind to settle (NAN24).

In addition to religious activities, participants engaged in activities of daily living that enabled them to manage their stress and improve their DSM.

Swahili: Na ninajipata nikitafuta kitu cha kufanya kama kutengeneza Kiondoo (kikapu cha kitamaduni) na halafu ninapotengeneza kiondoo mimi nahisi kama nimefanya kazi nzuri. Pia mimi huenda kwenye shamba na ninajaribu kulima. Hiyo ndio ile kazi mimi hufanya nikiwa nyumbani. Na wakati mwingine mimi humfungua mbuzi wangu, na nailisha hapo, kuku wangu mimi nawalisha wao hapo, mimi huwatunza,

ninawapa chakula na hiyo ndio kazi ninayofanya ninapotaka kupunguza hasira.

English: I try to identify some activities to keep me occupied, for example, making traditional baskets. When I engage myself in making the traditional baskets, I feel that I have done a satisfactory activity. So as to reduce my anger, I also I go to the farm and I try digging, and at times I take care of my goat and chicken (NAN19).

Emotional resilience is demonstrated in a statement by one of the participants:

Swahili: Huu mti ni kuweka maisha 'parralel' ili uweze kuendelea na maisha, kwa sababu unapokosa kuweka maisha 'parralel' wewe utapata kuwa kila wakati unaenda hospitalini. Kwa sababu ni lazima ufanye, ni lazima upitie. Sasa wakati wewe unaweka maisha paralell hayo maswala yote hupita.

English: This tree represents living a stress-free life. You have to live a stress-free life so that you can move on. If you do not live a stress-free life, you find yourself going to hospital frequently. Yes, because it is a must that you face issues in life, you must live a stress-free life to overcome challenges (NAN20).

The participant acknowledges that stressful moments do occur, but she does not let emotions get her down. NAN28 had an interesting explanation of how her life moves on in spite of diabetes-related challenges:

Swahili: Mawe ingine ni kubwa na ndogo. Saa ingine mto inafuruta hii mawe kutoka hukooo… juu yani maji ikiteremka unavuruta mawe. Huko ni mahali mto inapita, katikati ya mawe, inatafuta njia. Hata kama kuna shida ya sukari, nitapata njia ndio niweze kuishi.

English: Some of the stones are big while others are small in size. This is because as water flows, it pulls some stones along wherever it passes. In between the stones, the water finds a way. Even if I experience

problems with my blood sugar, I must find a way to continue living (NAN28).

In this statement, this participant acknowledges that her journey with diabetes involves challenges, which she metaphorically refers to as *stones*. However, life has to go on, even amidst challenges. This is a demonstration of the emotional resilience that enhances DSM. The participants also used metaphors such as *drawings of church buildings next to their rivers* (NAN24 and NAN25) to represent religious activities that enabled them to lower their stress levels. Effective stress management in the participants' rivers was also illustrated by features such as *well flowing river, slope in the river and continuing river flow* (NAN2, NAN6, NAN12, NAN17, NAN19, NAN27, NAN29).

Literature indicates that people with diabetes who experience stress are likely to have reduced motivation for engaging in recommended lifestyles modifications (Hackett and Steptoe, 2017, p. 551). A study that was conducted among people with diabetes in Hulu district in Malasya found that depressed people with diabetes had lower self-efficacy, which was accompanied by inadequate self-care behaviours (Devarajooh and Chinna, 2017, p. 5). The conclusion is that sufficient DSM can be achieved when effective stress management is realised by people with diabetes. Findings of a research that was conducted in South Africa among health care providers suggests that patients who had high levels of resilience were able to overcome barriers in their health (Abrahams *et al.*, 2019, p. 4).

Though some of participants of the current study exhibited emotional resilience and stress management approaches for successfully navigating through DSM challenges, some of the participants saw such challenges as barriers to DSM. Barriers to DSM comprised the second theme that emerged from the KAWA group discussions, and will be discussed in Section 5.3.

5.3 THEME 2: BARRIERS TO EFFECTIVE DIABETES SELF-MANAGEMENT

The second theme that was revealed through the Kawa discussions was barriers to effective DSM. The term barrier refers to anything that blocks someone from doing

something (Cambridge English Dictionary, 2019). Barriers to effective DSM are those factors that hinder individuals with diabetes from engaging in recommended self-management practices. The five categories that emerged to support the theme of barriers to effective DSM are:

- Economic determinants hindering DSM
- Dietary factors hindering DSM
- Support networks hindering DSM
- Emotional barriers hindering DSM
- Health/physical status hindering DSM

5.3.1 Category 2.1: Economic determinants hindering DSM

Economic determinants were cited as one of the major factors that hindered DSM in Kenya. Economic determinants of health is one of the components of social determinants of health that is seen to affect the health status of individuals and their ability to deal with illness (Lee *et al.*, 2010). The codes that reinforce the category of economic determinants hindering DSM relate to factors such as lack of employment and money, out-of-pocket payment for diabetes treatment, the high cost of diabetes management, and concerns about NHIF premiums.

5.3.1.1 Code 2.1.1: Unemployment/lack of money hinders DSM

Unemployment and lack of money was a major factor raised by the majority of the participants as a barrier to DSM. Unemployment refers to a situation where an individual cannot find a job when they are actively seeking one (Komlos, 2021). In this study, unemployment refers to the inability to find and engage in an economically gainful activity that would enable people with diabetes to have the necessary money to support their DSM. It was evident that a lack of employment meant participants did not have the money to perform certain activities, such as buying food and drugs that could have facilitated their self-care practices.

Swahili: Sasa ni ule wakati ambao niliacha kufanya kazi na mimi nikakuja, ile mapato niliyokuwa nayo ilipungua, kwa hivyo swala kuhusu dawa na kliniki, likawa tatizo.
English: Now, this was at a time when I stopped working, and my income reduced. Accessing the clinic and medications became a problem (NAN7).

Swahili: Hapana, mimi sijaajiriwa kazi, mimi hufanya tu ukulima, kupata pesa ya dawa na chakula kizuri ni shida.
English: No, I'm not employed, I just do farming. Getting money for good food is a problem (NAN20).

Swahili: Ndio, hakuna pesa. Hayo ni matatizo kama ukosefu wa wa kazi, ukosefu wa pesa ya kununua chakula, na pesa ya kuja kwenye kliniki.
English: Yes, there is no money. Those are challenges like lack of a job, lack of money for food, and money for coming to the clinic (NAN23).

In addition to unemployment causing a shortage of money, some participants (NAN21 and NAN24) said that their diseased state made them weak, and so they could not work to get money to buy medicine.

Swahili: Ndio unaona nyoka katikati, yani……shida, kukosa pesa ya kununua dawa, sababu sikuwa na nguvu ya kufanya kazi.
English: That is why you can see the snake at the centre of the river, that are problems. I lack money because I had no energy to work so that I get money to buy medicine (NAN21).

Swahili: Mimi mgonjwa, sina nguvu ya kufanya kazi ndio nipate pesa.
English: I'm sick, I have no energy to work, so that I get money to buy drugs (NAN24).

It was disheartening to learn that one participant (NAN23) had lost his business, which had been his main source of income, due to Covid-19 pandemic restrictions. This

participant lacked the money to buy drugs and food, or even the bus fare that would enable him to attend a diabetes clinic.

> *Swahili: Huu mti ni shida za korona, hakuna pesa kwa sababu hatuwezi kufanya biashara, tunaambiwa tukae nyumbani, na sina pesa ya kukuja clinic, hata ya dawa hakuna. Pia natakikana niwe na transport ndio nikuje clinic.*
>
> *English: This tree represents Corona problems; there is no money because we cannot do business, we are restricted to stay at home, I don't have money to pay for my fare to the clinic nor buy medication. As a result, I have missed some of my clinic appointments. Again, I'm supposed to have transport so that I come to the clinic. At times I miss coming to the clinic (NAN23).*

Some of the participants (NAN1, NAN26) indicated that they did not own a glucometer or medicine, because they lacked money to buy it.

> *Swahili: Jiwe langu la kwanza ni ukosefu wa dawa, na ukosefu wa maishine ya kujipima, kwa sababu ile bei iko ghali, Mimi sina uwezo wa kununua kwa sababu sina pesa.*
>
> *English: My first stone is lack of medicine and lack of machine for monitoring myself, because the price is so high, I don't have the ability to buy because I don't have money (NAN1).*

> *Swahili: Unaona hiyo ni shida yake inasumbua wagonjwa wengi. Sasa kama mimi saa ingine nakosa pesa ya kununua dawa).*
>
> *English: Most of us have the same problem of lack of money as [NAN 25] For example, I do not have money to buy medication (NAN26).*

The participants used various metaphors in their rivers to illustrate problems relating to lack of money. The majority of them (K2, K3, NAN 1, NAN 2, NAN 5, NAN 6, NAN 8, NAN 23 and NAN 29) drew stones in their rivers to represent lack of money. Some of the participants assigned characteristics to the stones in their rivers, to emphasise the

magnitude of the problem. For instance, K2, K3, and NAN5 drew *many stones* in their rivers; this meant that lack of money was a predominant problem in their lives. NAN1 referred to his stone as the *first stone,* to imply that the first major challenge he experienced was lack of money. NAN2, in turn, stated that the stones in his river *were here and there*, meaning that a lack of money was a continuous problem in his life. Similarly, NAN23 stated that the stones were present from the beginning to the end of his river. NAN29 gave an exceptional description of the stones in his river:

> *Swahili: Ehee, amegonga hii mawe akaenda inje ya maji, kama shida inazidi vitu vizuri vinatorokakwa maisha, yangu. Kama sasa sina pesa, siwezi kupata hii samaki au chakula mzuri.*
>
> *English: Yes, this fish hit on this stone and it was thrown out of the water. When problems increase, good things disappear from my life. For instance, when I do not have money, I cannot get this fish, or good food (NAN29).*

With this statement, NAN29 meant that a lack of money caused all the appropriate factors that could enhance his DSM behaviour to vanish from his life. In addition to *stones*, other participants (NAN10, NAN21, NAN24, NAN26) referred to lack of money as *snakes* and *crocodiles*. NAN24, in particular, stated that the crocodile *(lack of money)* in his river was causing his river to dry up. In other words, his life was becoming unproductive, because he could not manage his condition of diabetes, due to insufficient funds.

> *Swahili: Huyu mamba ni kukosa pesa, sasa bila pesa nikama mto inakuka.*
> *English: Crocodile is lack of money, now, without money, is like the river is drying up (NAN24).*

Another participant (NAN26) also indicated that the snake in his river was blocking his river from flowing. This meant that a lack of money prevented him from progressing in life, as she was not able to manage her diabetes situation.

Swahili: Ni … nyoka, inalala hivyo kwa maji. Sasa maji inaenda hukooo … itapitia wapi na hiyo nyoka iko hapo.
English: It's a snake, it lies like that in the water, and the water is blocked by the snake (NAN26).

NAN23 used the metaphor of *a tree that has fallen in the water* to denote problems related to the Covid-19 pandemic, and the associated lack of money. He stated that *the fallen tree* was *blocking the river.*

Swahili: mimi nimechora hii nini … ni mti imeanguka kwa maji. Ndio unaona hapa mwisho hii mti imeanguka kwa maji na inazuia mto.
English: I have drawn this thing … It is a tree that has fallen in the water. That is why you see here at the end this tree has fallen in the water and it is blocking the river (NAN 23).

The views of these participants concerning their unemployment and lack of money, which was a hindrance to their performance of recommended self-care practices, was also identified by other studies. In Ethiopia, the lack of money of participants with diabetes were studied in a systematic review, and was identified as one of the major barriers to DSM (Abate *et al.*, 2021, p. 16).

Similarly, lack of money was one of the factors that was associated with non-adherence to medication in a study that was conducted in Cameroon among people with diabetes (Aminde *et al.*, 2019, p. 5). In addition to these findings, a high percentage of people with diabetes in Nigeria did not have glucometers at home, owing to their low socio-economic status (Aniedi, Effiong and Akpan, 2020, p. 428). In this case, low economic status implies that the participants did not have the money to use to support their DSM. Financial constraints faced by people with diabetes in Uganda deterred their clinic follow-ups (Chang *et al.*, 2019, p. 9). Like in the current study, low employment status and financial constraints were recorded in the Iteso community in western Kenya (Ebere, Kimani and Imungi, 2017). According to the reports of the participants with diabetes of this current study, lack of employment and money was compounded by out-of-pocket payment required for health care services.

5.3.1.2 Code 2.1.2: Out-of-pocket payment complicates DSM

A few participants aired their views concerning out-of-pocket payment for diabetes management. Out-of-pocket payment is defined as direct medical costs that families and individuals pay, depending on their readiness and ability to pay (Fu *et al*, 2018, p. 10). In the current study, out-of-pocket payment refers to payment for services, using their own money, by people with diabetes. One of the participants (K1) said that, for him to be tested at the hospital for diabetes, he had to pay cash. He reported that out-of-pocket payment, which was expected for his clinic after diagnosis, had become a challenge.

> *Swahili: Nililipa pesa wakanipima wakapata ugonjwa, nikakuja Kakamega nikaanza clinic. Wakati nilianza nilikuwa na shida ya kulipa pesa kwa clinic.*
> *English: I paid money and they tested me and they made the diagnosis. I came to Kakamega to start the clinic and at that time I had challenges of paying for the clinic (K1).*

This code was confirmed by NAN7, who indicated that attending a health care facility where he was expected to pay cash became a challenge for following up scheduled clinic visits that were crucial to his self-management. He associated this problem to lack of money. In addition, NAN21 indicated that she was asked to buy drugs, but that she had no money.

> *Swahili: Wakaniambia ninunue dawa na pesa hakuna, si unaona hii ni shida tu?*
> *English: I was asked to buy medicines, but I had no money, you see, these are just problems (NAN21).*

NAN22 was concerned about how she would afford diabetes care once she retired from employment. She was concerned that it would be difficult for her to continue paying for her diabetes care from her pocket in the future. NAN7 indicated that he started his diabetes treatment at a private hospital, where he was expected to pay for diabetes services from his pocket, and that this had become a challenge.

Swahili: Na nilikuwa najiuliza wakati nitaenda retire kama nitaweza afford hizo dawa na kulipa private hospital.
English: I asked myself whether I could afford to pay for the medication in a private hospital after retire (NAN22).

Swahili: kwa hivyo swala kuhusu dawa na kliniki, kwa sababu nilikuwa naenda mahali ambapo nilikuwa nailipa ilikuwa shida kwa sababu ya ukosefu wa pesa
English: Because I used to visit a hospital where I had to pay, it became a problem because of lack of money (NAN7).

NAN22 compared paying for diabetes care from her pocket in the future to *a very big stone.* This shows that this participant was apprehensive about maintaining her self-care after retirement, because of anticipated costs in the absence of an income. K1 indicated that, in his river there were *many stones and the water [was] moving badly,* which he associated with out-of-pocket payment for diabetes management.

A narrative review on the state of diabetes in sub-Saharan Africa (which includes Kenya), reveals that most health care expenditure, including that for diabetes, is financed by out-of-pocket payments (Pastakia *et al.*, 2017, p. 255). Oyando *et al.* (2019, p. 292) explain that out-of-pocket payment is one of the modes of financing health care in Kenya. People with diabetes in Zimbabwe were impoverished by out-of-pocket expenditure, and this resulted in poor performance of self-care practices (Zeng, Lannes and Mutasa, 2018, p. 309). Literature reveals that out-of-pocket payment commonly leads to catastrophic health care expenditure. Catastrophic health care expenditure is experienced when out-of-pocket payment for health care services exceeds household resources, leading to the inability of the household to afford other essential needs (Mutyambizi *et al.*, 2019, p. 2). Catastrophic health care expenditure has been reported by patients with diabetes in Kenya, with nearly three quarters of the participants experiencing this challenge (Oyando *et al.*, 2019. p. 304).

One of the reasons why people with diabetes have to pay for health services out of their pockets in Kenya and other LMICs is the high cost of diabetes management (Pastakia *et al.*, 2017, p. 255), which will be discussed in Section 5.3.1.3.

5.3.1.3 Code 2.1.3: High cost of diabetes management restricts DSM options

The researcher infers the term, *cost of diabetes management,* from the recognised term, *cost of illnes,* which is defined as resources used to treat a disease (Afroz *et al.*, 2018, p. 2). This could be either direct medical costs that deal with hospitalisation, medication, laboratory tests and travel costs, or indirect costs, such as costs associated with time lost and premature death (Afroz *et al.*, 2018. p. 2). In the current study, the high cost of diabetes management refers to perceived increased financial resource implications on direct cost incurred for DSM. Some of the participants stated that diabetes medications and other self-care resources, such as insulin needles and recommended diet, were costly.

> *Swahili: Na hiyo sindan ni bei ghali, ni 800 kwa parket, na haitoshi mwezi. Sasa unapata hata sukari haitulii.*
> *English: And those needles are expensive. They cost 800 shillings per packet and it is not enough per month. Now you find even the sugar is not settling (NAN27).*

> *Swahili: Mchele wanasema tukule ya brown lakini bei iko juu, sasa mimi nakula tu ile nimepata).*
> *English: We are advised to eat brown rice, but it is costly and so I eat what I can afford (K2).*

> *Swahili: Hizi dawa zilikuwa zikiathiri mahali pengine kwa kuwa hizi dawa zilikuwa bei ghali.*
> *English: I was started on medication which affected my resources, because the medications were expensive (NAN10).*

One of the participants who attended a private clinic at the time of diabetes diagnosis complained that the doctor was prescribing expensive medication which caused her a lot of stress and unsettled blood glucose levels.

> *Swahili: Lakini nikiendelea na hiyo clinic daktari alikuwa ananiandikia dawa expensive, na nikaanza tena kuwa na wasiwasi.*
> *English: But as I continued with that [private] clinic the doctor was prescribing expensive drugs and this worried me again and my blood sugar shot up (NAN 22).*

The high cost of insulin needles caused NAN27 to sometimes reuse needles, and she reported that her glucose levels were not controlled.

> *Swahili: Haki sasa wakinipatia sundano ya wiki moja kwa mwezi, si unaona haitoshi? sasa inabidi tu nirudie kutumia sindano Zaidi ya mara moja na hiyo si vizuri. Sasa unapata sukari haitulii.*
>
> *English: Surely, at the clinic they only give us needles for one week in a month. That is not enough. So, at times I find myself reusing the needles because they are expensive, and that is not good. Now you find that sugar is not settling (NAN27).*

The participants used metaphors such as *crocodiles* (NAN4) and *stones* (NAN10 and NAN13) to symbolise the problem relating to the high cost of diabetes management.

> *Swahili: Kwa hivyo huyu mamba ni shida nilipata kwa sababu dawa zingine ni bei ghali, bei ghali sana).*
> *English: So this crocodile shows the problems I got because some drugs were expensive, very expensive (NAN4).*

NAN10 indicated that *his river was becoming narrower* because of the high cost of diabetes management. This implies that his health, as someone with diabetes, was not optimal, because of the high cost of treatment, which interfered with his self-management.

It is known from literature that cost is a major barrier to diabetes management in LMICs (Suglo and Evans, 2020, p. 13; Pastakia *et al.*, 2017, p. 255), and that it imposes a huge economic burden on individuals with diabetes, and stands in the way of DSM (Afroz *et al.*, 2018, p. 1). Senegalese study participants with diabetes voiced concerns that they were unable to afford recommended food and medicine because of high cost (Zimmermann *et al.*, 2018, p. 2). Literature suggests that the high cost of diabetes management for people with diabetes in Kenya is influenced by factors such as the cost of medicine and traveling expenses (Oyando *et al.*, 2019, p. 296). In another Kenyan study, participants stated that diabetes management approaches, including treatment, were unaffordable (Masaba and Mmusi-Phetoe, 2020, p. 2074). The findings of the current study are, therefore, congruent with that of other studies concerning the high cost of diabetes management.

5.3.1.4 Code 2.1.4: NHIF premiums hinder effective diabetes management

Although the health care system in Kenya has established a health care financing scheme – the NHIF (Ministry of Development and Planning, 2017, p. 24) – some participants indicated that the premiums for membership to this scheme acted as a hindrance to obtaining benefits from the scheme.

The NHIF premium is a compulsory fee of Ksh 500, payable to the fund by bona fide beneficiaries every month (Barasa *et al.,* 2017, p. 11). Some of the participants who had not joined the NHIF indicated that the reason for not doing so was related to cost: They could not afford the basic premium. If an individual does not subscribe to the fund by paying the monthly premium, they could not benefit from the scheme. For instance, NAN23 indicated that he was not able to attend his clinic regularly, because he could not pay the NHIF premium.

> *Swahili: Na mimi sijakuwa na pesa ya kulipa hiyo NHIF tangu mwaka ianze nimekuja tu clinic mara mbili.*
> *English: I have not had money to pay for NHIF since the year started, and I have only come to the clinic two times (NAN23).*

Another participant revealed that people's failure to pay for NHIF premiums had been taken up by the county government, which had offered to pay on behalf of people with diabetes during Covid-19 pandemic period. However, this participant indicated that most people with diabetes were afraid of taking up this offer, because they were too afraid of contracting Covid-19. In turn, one of the participants who had not paid her NHIF premiums stated that she had not received the information about county government paying NHIF premiums.

> *Swahili: Mimi najua serekali ya county ilikuwa inatafuta wagonjwa wa sukari ili walipiwe NHIF na governor, lakini wagongjwa walikataa kujitokeza, ni kama wanaogopa kupatwa na korona.*
> *English: I know the county government was looking for people with diabetes so as to pay for them NHIF by the governor, but patients refused to present themselves, it is like the patients fear to contract corona (NAN22).*
>
> *Swahili: Mimi sijasikia kama governor anaita watu awalipie.*
> *English: I have not heard if the governor is asking people to pay for their NHIF (NAN23).*

The study participants did not use any metaphors to represent NHIF premiums – this information was elicited during the discussion sessions.

A study conducted in Kenya found that the majority of participants with diabetes considered NHIF premiums to be unaffordable (Barasa *et al.*, 2017, p. 7). The flat rate premium of Ksh 500 was seen as one of the factors contributing to low NHIF enrolment in Kenya (Wanjiru, Yitambe and Chomi, 2019, p. 38). These reports confirm that of the current study.

Participants who could not afford NHIF premiums were likely to find it challenging to conform to dietary recommendations for DSM. This factor will be discussed in Section 5.3.2.

5.3.2 Category 2.2: Dietary factors hindering DSM

Discussions on dietary factors that influence DSM revealed that some participants were unable to procure or access the recommended food; consequently, they did not comply with guidelines on dietary modifications. The participants' comments on their failure to consume the right types of food were grouped together in one code, labelled *Food shortages cause non-compliance to dietary recommendations*.

5.3.2.1 Code 2.2.1: Food shortages cause non-compliance to dietary recommendations

The term food shortage is used interchangeably with the term food insecurity. Food security is said to exist when all people can, at all times, access sufficient, safe and nutritious food that meets their nutritional requirements and preferences (Stefanis, 2014, p. 75). Therefore, food shortage, in this study, refers to lack of access to recommended foods that are considered to enhance the glycaemic control of people with diabetes. In this study, it was evident that some participants had concerns about access to food that could help to manage their diabetes. One of the participants, K1, categorically stated that he experienced challenges getting the recommended food, such as finger millet, which was difficult to find.

> *Swahili: Chakula kinanisumbua, ninakula ugali wa wimbi, na kupata wimbi ni shida.*
> *English: Finding proper food is a challenge, I eat finger millet ugali, and getting finger millet is a problem (K1).*

In turn, other participants (K3, NAN1, NAN6, NAN20) indicated that they did not have access to the right food to manage their glucose levels. NAN1 and NAN20 said that, because they lacked access to the right food, they ended up eating food that was not recommended, which had a negative effect on their blood glucose levels.

Swahili: Ninakosa chakula na chakula kinafanya sukari kwenda juu.
English: I lack food and inappropriate food makes my sugars go up (NAN1).

Swahili: Kuna nyakati ambazo sipati chakula kilichopendekezwa nalazimika kukula chakula ambacho hakijapendekezwa, ambacho mimi sifai kukila.
English: There are times I don't get the recommended food; I'm forced to eat the food that is not recommended (NAN20).

Metaphors that were used to illustrate the problem of a lack of food in the rivers of the patients include *stones* (K1, NAN1, NAN6). K1 and NAN1, in particular, described these stones as *small stones*, though did not explain why they referred to them as such. The researcher's interpretation of their reference to the size of the stones is that the participants probably did not attach a great deal of importance to the challenge of a shortage of the right type of food. This interpretation is confirmed by the finding that few participants were keen to discuss healthy food choices (*cf.* 5.2.2.1). NAN20 drew *frogs* in his river to represent a lack of food, while K3 said that a lack of appropriate food was like *snakes in the river*. This implied that this participant experienced a lack of the right type of food as a barrier to managing his condition.

Swahili: Hii nyoka ni kukosa chakula.
English: This snake represents lack of food (K3).

The study participants in the current study did not discuss reasons why they experienced food shortages. However, literature reports that food shortage could be brought about by environmental seasonal changes, which affect individuals with diabetes who produce their own food on their farms. According to a study in Uganda by Auma *et al.* (2020, pp. 8–9), environmental changes are likely to affect the availability of foods such as fruits and vegetables for both rural and urban dwellers who depend on locally available food. These authors also indicate that people with diabetes who rely on food that they buy could experience shortages of food if they do not have the money to buy food or if food prices are high. In another study done in Uganda, participants indicated that shortages of certain

types of food reduced dietary diversity and people with diabetes and their family members ended up eating only one type of food (Kiguli *et al.*, 2019, p. 6).

5.3.3 Category 2.3: Support networks hindering DSM

In the current study, some factors related to support structures were seen to contribute to inadequate DSM by the study participants. Participant concerns on support structures informed this category.

Support network refers to "a group of people who provide emotional and practical help to someone in serious difficulty" (Cambridge English Dictionary, 2021). Areas of concern identified by the participants in relation to their negative impact on DSM were a perceived lack of family support, a shortage of health care providers, shortages of supplies, such as insulin needles and some drugs, as well as lack of self-care resources. Participant information on these factors was grouped under two codes that are related to DSM barriers, namely *Perceived lack of family/social support is a barrier to DSM*, and *Shortage of health care providers/supplies and lack of self-care resources hinders DSM*.

5.3.3.1 Code 2.3.1: Perceived lack of family/social support is a barrier to DSM

Lack of family support was one of the concerns that emerged during the discussions, and this contributed to ineffective self-management by the study participants. In this study, lack of family support refers to the perceived absence of assistance by family members for diabetes management. Two of the participants reported perceived lack of support by their spouses. K2 said her husband caused her a great deal of stress, and this caused her to struggle to control her glucose levels.

> *Swahili: Na mzee anakuletea stress kama huna pesa hauwezi kabisa.*
> *English: And my husband stresses me up, if you don't have money you can't make it (K2).*

This participant did not discuss exactly how her spouse caused her to experience stress, but it is evident that a lack of family support led to insufficient DSM, as evidenced by reported uncontrolled glucose levels. Another participant (NAN 4, 75 years of age) also

indicated that his family members relied on him for various forms of support, instead of him (the participant) being able to rely on the family members to support him. This caused him to experience stress, as he had to manage family affairs at an advanced age, instead of concentrating on managing his condition.

> *Swahili: Kwa hivyo mimi nilikuja, ilikuwa shida kwa sababu hata wale wangenisaidia walikuwa wananitegemea mimi, ehh, ndio sababu wewe unaweza kuona ninapata shida zingine hapa (Akionyesha mawe kwenye mto wake).*
> *English: This was a problem because even those who would have helped me were depending on me, yes, that is why you can see I'm getting more problems here [pointing to stones in his river], OK? (NAN4).*

Another participant stated that family problems caused her stress, which prevented her from thinking about how she should manage her condition.

> *Swahili: Shida za familia mtu anapata shida nyingi kutoka kwa familia hadi unapata stress. Na unapopata stress sukari inapanda kwa sababu huwezi kufikiria vile utajitunza.*
>
> *English: Family problems, you get a lot of problems from the family until you get stress and blood sugar goes up, because it is difficult to think about caring for myself (NAN 8).*

One of the male participants shared information about his strained relationship with his spouse, which affected him psychologically. He indicated that his wife had relations with other men, and that this was a big challenge to him.

> *Swahili: Na bibi yangu alianzaa kwenda na watu wengine. Hiyo ni shida kubwa kwangu.*
> *English: And my wife started having affairs with other people. That is a big problem to me (NAN9).*

Yet another participant reported that her husband had deserted her for other women when she was diagnosed with diabetes. This situation left her to deal with all the family

responsibilities alone, such as raising the children and single-handedly managing household duties. This caused this participant to be extremely strained, in psychological and physical senses, and the strain was reflected in her lack of DSM.

> *Swahili: Hizi mawe ndio mahali ambapo shida zilianza wakati nilipopata kisukari, kwa sababu nilikuwa mja mzito na mtoto wangu wa mwisho. Kwa hivyo wakati ule nilikuwa hivyo, mume wangu hakuwa Karibu. sasa alikuwa ameenda Afrika Magharibi. Kwa hivyo ilikuwa kuwa huyu mamba alionyesha zile shida nilikuwa nimepitia, niliishi kulazwa, naachiliwa, nalazwa, naachiliwa hadi nilipobainika kuwa nina ugonjwa wa kisukari nilipokuwa nikimtaraji yule mvulana. Baadaye nilipokuwa nikimpata yeye,mimi nilifanyiwa upasuaji na yeye alikuwa mtoto wa mwisho. Halafu hapa nilikuwa, nilipokuwa nikimlea alianza shule na nilikuwa nikibaki nyumbani peke yangu. Mume wangu alikataa na hata akaondoka nyumbani, ako na wananwake wengine huko nje, Alikataa kuelimisha huyu kijana wa mwisho.*
>
> *English: When I was pregnant with my last-born child, my husband was not around. because he had gone to West Africa. Then here I was, as I brought him [youngest son] up he started schooling I used to remain alone at home. So, I was doing all the work alone and it became difficult to control my blood sugar. My husband refused to assist me and he even left home, he has other women and he refused to educate our last-born son (NAN 3).*

Metaphors that were used by the participants to show lack of family support included *water not flowing well, crocodiles in the water* and *stones.*

The literature demonstrates lack of family/social support as a limiting factor to DSM. In Ghana, health care providers' perspectives about barriers of self-management facing people with diabetes related to a perceived lack of social support, which was gender specific (Mogre *et al.*, 2019). Health care providers indicated that failure by spouses to accompany men with diabetes to nutritionists' visits lead to the men with diabetes failing

to adhere to dietary recommendations (Mogre *et al.*, 2019). Another report of a lack of social support is that of men with diabetes in sub-Saharan Africa who had sexual dysfunction. Men with diabetes who experienced sexual dysfunction tended to blame others, and experienced conflict and unhappiness in their relationships, which contributed to reduced support (Cooper *et al.*, 2018). In the current study, only one male participant referred to sexual dysfunction (*cf.* 5.3.5) that was accompanied by reduced social support, that led to his reduced DSM. Lack of social support was reported by Ethiopians with diabetes, who claimed that they received little support from their friends, and that they felt lonely about their condition (Bhagavathula *et al.*, 2018, p. 3). Various studies that were done in Kenya found that lack of social support was a major barrier to DSM (Masaba and Mmusi-Phetoe, 2020, p. 2075; Waari, Mutai and Gikunju, 2018, p. 4).

5.3.3.2 Code 2.3.2: Shortage of health care providers/supplies and lack of self-care resources hinders DSM

In addition to perceived lack of family/social support, the participants of this study expressed concern about how a shortage of health care providers, supplies and self-care resources hindered DSM.

Shortage of health care providers refers to inadequate staff ratios that occur when, among other factors, hospitals are not in a position to hire staff at prevailing wages (Winter, Schreyögg and Thiel, 2020, p. 380). In the current study, staff shortages were operationalised as an insufficient number of health care providers to offer services to people with diabetes in the health care set-up. Similarly, a shortage of supplies refers to the unavailability of medical products and other health care support equipment (Musazzi, Di Giorgio and Minghetti, 2020) that are required to facilitate care of patients. Self-care refers to individual responsibilities undertaken by patients with the aim of coping with a health condition (Ncama, 2011). Therefore, in this study, lack of self-care resources refers to the unavailability of resources that can help the diabetic patient to engage in self-care practices on their own. Shortages of staff, supplies and self-care resources were identified as a barrier to DSM by the study participants. One of the participants indicated that the

unavailability of health care providers meant she lacked knowledge on how to care for herself (in the Kenyan context, patients refer to any health care provider as doctor):

> *Swahili: ukosefu wa madaktari na dawa na pia mashine ya kupima sukari, inafanya nisijue vile ya kujitunza.*
> *English: Lack of doctors [health care providers] medicine and glucometers makes it difficult to do know how to care for myself (NAN8).*

In this statement, NAN8 indicates that a lack of supplies, such as medicine and glucometers hindered her DSM. This same barrier was raised by other participants, such as NAN16, NAN24 and NAN25. Some of the participants stated that they expected NHIF services to provide all medications and other supplies, such as strips and insulin needles, at the hospital pharmacy. However, participants reported that pharmacy staff often told them that some of the supplies were out of stock. This caused additional expenses for the participants, who had already paid the NHIF premiums, but could not receive all the supplies they needed from the hospital. In such cases, individual patients were required to purchase these supplies using an out-of-pocket funding approach, which is seen as a major barrier to treatment compliance and DSM (*cf.* 5.3.1.2).

> *Swahili: Ingawaje dawa zingine haziiwezi patikana kwenye hospitali, tunaambiwa tununue. Kama hatuna pesa, anakosa kumeza hizo dawa.*
> *English: Although some medications are not available in the hospital, we are asked to buy. If we do not have money, he (NAN16) misses to take the medication (NAN16 informant).*

> *Swahili: Tuseme ilipunguza, shida za zilipungua tu. Unaona Saa ingine mtu akikuja unapatiwa dawa moja lakini ingine unaambia hakuna. Sasa kama hakuna pesa, mawe mawe hapa na pale na hauwezi kumeza dawa vile daktari anaeleza.*
> *English: My problems just reduced because at times when someone comes to hospital, you are given one drug and you are told that the other drug is not available. So, if you do not have money, stones remain here*

and there, and you cannot take medications as the doctor advises (NAN24).

Swahili: Unajua NHIF inatusaidia, lakini sasa mara nyingi huko kwa pharmacy ya dawa, saa ingine dawa tunaambiwa imeisha, tuende tujinunulie, pengine mtu hana pesa.
English: You know NHIF helps us but now at the pharmacy, we are told that are not available. So, we have to buy using our own money, and may be someone does not have the money (NAN26).

Swahili: Shida hiyo NHIF hawatupatii vitu yote ya kujidunga dawa. Kama dawa wananipatia chupa kama mbili, hiyo ni sawa, lakini sindano ya kujidunga wanakupatia tu ya wiki moja. Haki sasa wakinipatia sundano ya wiki moja kwa mwezi, si unaona haitoshi? sasa inabidi tu nirudie kutumia sindano Zaidi ya mara moja na hiyo si vizuri. Na hiyo sindan ni bei ghali. Haki.
English: The problem with that NHIF is that they don't give us all the supplies that we need to inject ourselves. For example, they give enough medication. But they only give me needles for one week which are not enough? Because of this, I'm forced to reuse the needles, which is not good. The needles are expensive (NAN27).

Other self-care resources that were lacking, and therefore negatively impacting on DSM, was glucometers and strips. It became clear in the participant discussions that individual patients were expected to purchase their own glucometers and strips. Some of the participants said that they did not have money to buy the glucometers, and even if they had glucometers, they still faced the challenge of buying strips. Shortages of these crucial self-care resources meant recommended self-management behaviours could not be performed.

Swahili: Jiwe langu la kwanza ni ukosefu wa dawa, na ukosefu wa mashine ya kupima sukari kwa sababu ile bei iko ghali, Mimi sina uwezo wa kununua kwa sababu sina pesa.
English: My first stone represents lack of medicine and lack of a glucometer, which is costly. I do not have the money to buy it (NAN1).

Swahili: Nikipata vijiti ya kujipima huwa napima, lakini hata kama niko na mashine, hiyo vijiti ya kujipima lazima tununue kila wakati.
English: If I get the strips I check my blood glucose, but even if I have the glucometer, I'm always forced to buy the strips (NAN27).

Swahili: Kwa mfanomashine ya ugonjwa wa kisukari, hiyomashine ya sukari, wakati mwingine sikuangi nayo, wakati mwingine niko nayo,na wakati mwingine nina tatizo la kununua vitu hivyo vinavyohitajika kwenye hiyo mashine.
English: For example, there is a machine for diabetes, this glucometer which I sometimes have. Sometimes I have the challenge of buying the strips (NAN 5).

Metaphors that the participants used to illustrate the challenge caused by the lack of the resources as discussed above, include *small stones,* which denote lack of medicine in the hospital pharmacy (NAN26), *stones, a crocodile* and *stormy water* (NAN24), as well as *a small hill in the river,* representing lack of strips (NAN27).

Literature indicates that a lack of resources is a common problem in diabetes management. According to Usman and Pamungkas (2018, p. 10), a lack of resources, and inadequacies regarding drug supplies, were barriers to DSM for people with diabetes in Indonesia. A scoping review that was conducted by Zimmermann *et al.* (2018, p. 11) indicates that resource constraints in health systems in sub-Saharan Africa limit the support that health care providers can offer to people with diabetes. Health care systems-related barriers to diabetes management in Nigeria included inadequate health care facilities, health system instability, and poor remuneration of health care workers (Ugwu *et al.*, 2020, p. 79). Elsewhere, lack of diabetes support staff were reported in two different

studies conducted in Nigeria and South Africa (Ugwu *et al.*, 2020, p. 79; Abrahams *et al.*, 2019, p. 5). In a South African study, people with diabetes were of the opinion that staff shortages caused health care providers to come across as rushed, rude, and not willing to listen to their patients' opinions (Abrahams *et al.*, 2019, p. 6). In Kenya, research reveals that facility-related barriers to DSM included health messages from the health care providers to people with diabetes being perceived as ineffective (Masaba and Mmusi-Phetoe, 2020, pp. 2074–2075). Another study conducted in Kenya reveals that a lack of medicines and other diagnostic equipment in local hospitals caused study participants to attend hospitals that are located further away from their residences (Oyando *et al.*, 2019). A study that was conducted at Kenyatta National Hospital among diabetes outpatients, found that the majority of the participants did not own self-care resources, such as glucometers, and so they were not monitoring their blood glucose levels at home (Waari *et al.*, 2018).

5.3.4 Category 2.4: Emotional barriers hinder DSM

A lack of resources also contributes to emotional stress, which affects DSM negatively. The following category presents a discussion of emotional barriers to DSM. This category emerged with two codes, namely S*tress interferes with DSM,* and *Fears related to diabetes and its management hinder DSM.* Aspects related to stress that were discussed by the participants included perceived stress, causes of stress and the effects of stress.

5.3.4.1 Code 2.4.1: Stress interferes with DSM

Emotional factors, such as stress, were seen as a barrier to DSM by the study participants. Stress refers to self-reported negative feelings evoked by emotional stimuli (Visser *et al.*, 2019, p. 43). Participants who admitted to having encountered stress also indicated that stress was one of the factors that hindered DSM. NAN11 said that she suffered from stress that caused high glucose levels and, as a consequence, she was too weak to care for herself.

Swahili: Halafu nikapata dhiki, sukari yangu ikapanda hadi 34, 36, singeweza kujifanyia chochote.
English: Then I had so much stress, my sugar went up to 34, 36, I was not able to do anything for myself (NAN 11).

NAN 20 indicated that she suffered from stress because of the diabetes condition.

Swahili: Ni dhiki, kila wakati kwa sababu ya kuwa mgonjwa. Unapata kuwa sukari inaenda juu kila wakati, labda napata maumivu ya kichwa sana.
English: It is stress, every time it is just stress because of being sick. There are times when I get stressed up. The blood sugar then goes up and I get so much headache (NAN 20).

Causes of stress were identified by some participants, who also discussed how stress-related factors affected DSM. The Covid-19 pandemic containment measures, such as restriction of movement, was realised to be a cause of stress for participants with diabetes, and it affected their self-care behaviour negatively. The self-management of some participants who relied on their children for financial assistance was adversely affected, because their children were under lockdown. These participants also indicated that they could not go out to buy the recommended food and other supplies, such as soap, from the market; neither could they carry out business-related activities to earn money for self-management.

Swahili: Hiyo ni stress sana. Watoto wangu wako huko Nairobi. Na sasa hawawezi kuja kuniona kwa sababu wanaambiwa wataleta korona huku. Sasa ni shida mingi sana. Inaleta stress kwa sababu kutoka tuende kwa soko ama mahali kuna watu wengi hatuwezi, Hatuwezi kwenda kununua chakula kwa sababu haturuhusiwi kwenda sokoni.
English: That is a lot of stress. My children are in Nairobi but they cannot visit me because they are told they can transmit Corona to me. This causes a lot of stress, because I cannot go to the market where there are many people. We cannot even buy food from the market (NAN 22).

Swahili: Hatuwezi kuenda huko sokoni, hata kuenda kuomba mungu kwa kanisa hawaturuhusu, sijui kama nitapata hiyo korona? Na sina pesa. Watoto hawakuji nyumbani kuniona kwa sababu ya korona.
English: We cannot go to the market; neither can we attend church to pray to God. I might get Corona. At the same time, I do not have money because my children cannot visit me (NAN 21).

Swahili: Unajua hii korona sijui ni nini? Sasa wagonjwa wa sukari ndio tuko na tabu sana. Sasa tunaambiwa tusiende pahali kuna watu wengi, tuoshe mikono, tukule matunda. Ehhhe, sasa kama hatuwezi kwenda huko nahuko ni ngumu, chakula na sabuni itatoka wapi?
English: I do not understand what this Corona is all about. For people with diabetes we are in trouble, we are told that we should not go to places where many people are congregating, that we should wash our hands and eat fruits. If we cannot move from one place to another, where shall we get food and soap to wash hands? (NAN 24).

In addition to Covid-19 pandemic, past experience of having a family member living with diabetes caused stress and negatively impacted on DSM for NAN22 at the time of diagnosis.

Swahili: Lakini wakati niliambiwa niko na diabetes, ilikuwa vigumu kuaccept. Because huyu [NAN 21] ni mama yangu na niliona vile hii shida imemusumbua, so nilishindwa kama mimi nitawezana nayo.
English: When I was diagnosed with diabetes, it was difficult to accept, because [NAN 21] is my mother and I have seen how this problem troubled her, so I wondered if I would manage it (NAN22).

Increased family responsibilities caused stress and financial constraints for NAN18. She indicated that her daughters had delivered children while living under her roof, and that the burden of providing for their needs was squarely on her. She indicated that this occurrence caused serious financial strain, such that she did not have sufficient money

to care for herself. Similar financial constraints were identified as the cause of stress for and a hindrance to DSM by NAN11 and NAN20.

> *Swahili: Shida yangu kubwa ni binti zangu walio nyumbani, wao wana watoto na hawajaolewa na mimi sina kazi. Sasa hiyo ndio dhiki kubwa sana niliyo nayo.*
> *English: My biggest problem is my daughters at home, they have children and they are not married and I don't have a job. Now that is the greatest stress I have, I'm the one providing everything for them and I don't even have enough money for myself (NAN 18)*

> *Swahili: Kile kinanisumbua ni mawazo. Mimi nina watoto wadogo, kupata kitu cha wale watoto wadogo, unaona inanipa dhiki nyingi*
> *English: What disturbs me, it is thoughts. I have small children, and providing for their needs as well as mine makes me to be stressed up. (NAN 20).*

> *Swahili: Hapa nina watoto wa shule mimi nilikuwa nawaelimisha na sasa hio ni dhiki.*
> *English: At this time, I had school going children whom I was educating which made me to be stressed, and my blood sugar could not settle (NAN11).*

Participants illustrated the different causes of stress using various metaphors. NAN22 drew a very big stone in her river, which represented the Covid-19 pandemic and its associated troubles, such as the travel restriction of her children from Nairobi. This participant saw the stone as a very big problem that was *blocking her river from flowing*. Other metaphors used to identify different causes of stress that were associated with reduced DSM include a *crocodile in the river,* indicating increased family responsibilities (NAN14), *stones,* which shows increased family responsibilities (NAN20 and NAN18), and *dirty water,* which denotes Covid-19-related challenges (NAN21). NAN26 drew *a big wall* in her river, to denote Covid-19-related problems that affected her DSM.

> *Swahili: Unaona hapa kuna jiwe kubwa, Hata inazuia, karibu izuie maji kuenda. Ndio inaonyesha shida ya korona. Inaleta stress kwa sababu kutoka tuende kwa soko ama mahali kuna watu wengi hatuwezi, sasa ndio unaona nimechora hii mawe kubwa.*
> *English: You see here is a big stone. It is even preventing, almost preventing water from flowing. That shows the Corona problem (NAN26).*

In discussing Covid-19 and the associated factors, NAN24 stated, *that is why in my river at the end it is very muddy. When* Covid-19 struck, it made her river turbulent, and made her life worse. NAN8 was keen to identify the adverse effects of stress on DSM. In her river, she drew turbulence in the river flow. During the discussion session, she indicated that stress and its effect on her river was shown by *disturbed river flow.*

> *Swahili: Na maji ikienda vibaya inaonyesha vile tunajitahidi na haya maswala.*
> *English: And turbulent water shows how we are struggling with these issues (NAN 8).*

The findings of the current study that indicate that people with diabetes expressed experiencing stress, is supported by literature. Patients diagnosed with chronic diseases, such as diabetes, in LMICs are prone to stress (Stubbs *et al.*, 2018, p. 90). Zimmermann *et al.* (2018, p. 9) report similar findings in their scoping review. People with diabetes in sub-Saharan Africa expressed that they experienced stress on their journey with diabetes – this stress was associated with financial constraints, inability to keep diabetes under control, and conflicts about food (Zimmermann *et al.*, 2018, p. 9). A study that was conducted among Malaysian people with diabetes revealed that stress was common (Fisekovic Kremic, 2020, p. 59). In contrast to the Kenyan situation, Malaysian people with diabetes attributed stress to employment. In Kenya, participants who were not employed admitted to experiencing stress, while, in Malaysia, participants who were employed reported having stress. A Kenyan study on drivers of stress in people with diabetes found that women were more likely to report stressors than men (Mendenhall *et al.*, 2020, p. 261). In addition to stress, the other emotional factor that was seen as a

barrier to DSM was diabetes-related fears – this factor will be discussed in Section 5.3.4.2.

5.3.4.2 Code 2.4.2: Fears related to diabetes and its management hinder DSM

During the group discussions, participants' fears about diabetes and diabetes treatment were identified as barriers to DSM. Fear refers to "intense emotion brought about by the sensation of inevitable threat that triggers physiological responses" (APA Dictionary of Psychology, 2021). This study defines fear as an apprehensive emotional sensation that relates to being diagnosed with diabetes, and/or its management. In relation to the fear of diabetes, the majority of the participants (NAN3, NAN7, NAN8, NAN10, NAN11, NAN22, NAN27, and NAN29) acknowledged that, at the time of diagnosis, they found it difficult to accept that they had diabetes. Because of their fear of diabetes, these participants initially denied having the illness. Denial of a physical illness is a concept that applies to patients who do not accept their diagnosis (Goldbeck, 1997, p. 1). Unfortunately, denial of illness contributed to delayed uptake of DSM approaches. One of the participants (NAN22) indicated that she put off commencing treatment when she was diagnosed with diabetes.

> *Swahili: Before I got this disease I was very fine. My river was going very well. But when I was told I have diabetes, it was difficult to accept. Sikukubali kutumia dawa.*
> *English: Before I got this disease I was very fine. My river was going very well. But when I was told I have diabetes, it was difficult to accept. I did not even accept to take medication (NAN 22).*

Denial of diabetes management was also reported during the Kawa discussions. NAN7 stated that, at the beginning of his diabetic journey, his family members and himself did not accept recommended dietary modifications. These negative perceptions towards diabetes management delayed their willingness to accept dietary modifications.

> *Swahili: Haikuwa rahisi kubadilisha mtindo wa maisha wakati huo. Kwa sababu ya vile tulikuwa tumezoea, kama vile ilivyo nyumbani, kama ni*

bibi yangu, vile alikuwa amezoea kupika, ilikuwa ngumu. Kwa hivyo ilichukua muda na hio ndio sababu nilikuwa na mtikisiko katika mto wangu wakati huo.

English: It was not easy to change my lifestyle that time. For example, my wife not could not easily change the cooking style she was used to. So, it took time for us to adjust (NAN7).

One of the participants referred to fears about difficulties they could encounter during diabetes management. They stated that if they did not have medication for managing diabetes it would be like *a snake that would bite and kill her and like stumbling stones in his river that would stop the river from moving forward*. This participant was very pessimistic about diabetes, and this attitude could easily lead to inadequate self-management.

Swahili: Hii nyoka ni shida, hapa kwa maji inaweza kuuma mtu, sasa shida ikiendelea unaona ni kama nyoka inataka kuniuma, inaweza kuua mimi. Kama hii ugonjwa haina dawa ni kama nyoka ya kuua mtu. Na ndio unaona mawe, hapa unajigonga ukiendelea na maisha, inaweza kufanya mto ikose kwenda).

English: This snake refers to problems; the snake can bite someone. If problems persist, that is likened to a snake wanting to bite and kill me. If this disease is not treated, it can be likened to a snake that can kill someone. That is why you can see stones, where you hit yourself as you move on with life although the stones can stop the river from moving forward (NAN25).

NAN27, in turn, stated that diabetes was like a *dangerous animal that was at the centre of her river.* In a way, this participant was afraid that her life would revolve around diabetes and its complications. Focusing energy on the disease, instead of focusing on how she could manage the disease, could easily interfere with DSM.

Just as the participants of this study expressed fear and denial of their disease state, other studies conducted in LMICs identified similar emotional reactions in their

participants. Fear of being diagnosed with diabetes and denial of this chronic disease was reported by studies that were conducted in South Africa and other African countries (Suglo and Evans, 2020, p. 7; Abrahams *et al.*, 2019, p. 3). Young people with diabetes in Ghana were afraid of being reprimanded by their parents for not applying the prescribed lifestyle changes, and this made them unwilling to share their diagnosis with family and friends (Abrahams *et al.*, 2019, p. 4). Another study in Ghana reports that some people with diabetes failed to accept the diagnosis of diabetes as a chronic disease and, therefore, these participants struggled to adjust to recommended dietary practices (Hushie, 2019, p. 226). Because they lived with relatives with diabetes who had experienced diabetes complications, participants of systematic review studies in Africa expressed fear of diabetes complications (Suglo and Evans, 2020, p. 7).

Though such fears are generally seen to interfere with acceptance of the necessity for DSM, the general health and physical state of people with diabetes also affects DSM. The following category (*cf.* 5.3.2) reports on findings related to participants' views on the way their health/physical status affected DSM.

5.3.5 Category 2.5: Health/physical status hindering DSM

Diabetes, as a metabolic condition (Punthakee *et al.*, 2018, p. S10), has direct bearing on the energy levels of people with diabetes and on their health and physical status. Huber (2011) sought to change the current WHO definition of health, which states, "Health is a state of complete physical, mental and social well-being", to "health is the ability to adapt and self-manage" (Huber, 2011, p. 237). Nakagami *et al.* (2019, p. 1217) applied the term "physical state" in their study to refer to measurable aspects of health that relate to the physical composite of the body. For the current study, the researcher adapted Huber's modified definition of health. In this context, health refers to the ability of people with diabetes to adapt and self-manage their condition. We also consider the physical states of participants with diabetes to refer to the biological and physiological composites of the participants. In this study, the health/physical status factors that impaired DSM abilities were mainly complications and comorbidities of diabetes.

5.3.5.1 Code 2.5.1: Diabetes complications and comorbidities leads to inadequate DSM

Diabetes complications refer to adverse effects of diabetes which cause damage to various body systems, such as the eyes, cardiovascular system, and kidneys (Ministry of Public Health and Sanitation, 2010b). These complications end up causing secondary health problems, which are considered to be comorbidities. Some of the complications that were reported by the study participants include eye problems, severe high blood glucose levels, high blood pressure, renal failure, delayed wound healing and erectile dysfunction. The most frequently reported complication was severe high blood glucose levels. Some of the participants reported that diabetes caused them to lack the energy to perform self-care activities.

> *Swahili: Vile maisha imekuwa ngumu tangu baba yangu akuwe mgonjwa, shida ambazo baba yangu amekuwa nazo kama kutokuwa na uwezo wa kukula, kupoteza kumbukumbu na … kuwa mdhaifu, hawezi kutembea sana.*
> *English: Life has been challenging since my father became sick. He faces challenges such as inability to eat, loss of memory, weakness, and he cannot walk long distances (NAN15 informant).*

Even though NAN15's diabetic state could have contributed to general body weakness, old age also contributed to this problem, and led to reduced self-care ability. Another participant who also experienced reduced self-care because of old age is NAN16.

> *Swahili: Umri, ndio, umri. Themanini na saba miaka. Hakuna chochote ambacho anaweza jifanyia mwenyewe isipokuwa kuoga. Mmh, hawezi hata kidogo, hawezi.*
> *English: Age, yes age, he is 87 years. There is nothing he can do for himself apart from bathing. Mmh, he cannot take care of himself (NAN15 informant).*

Another participant reported that, when her blood glucose goes up, she becomes weak – then she cannot even walk. This implies that this participant has a reduced self-care ability when she goes into hyperglycaemia.

> *Swahili: Unapata kuwa sukari inaenda juu kila wakati, labda napata maumivu ya kichwa sana, miguu hukataa kutembea vizuri, kutembea huwa shida, wakati mwingine kupata usingizi ni shida.*
> *English: You find that blood sugar is constantly elevated and at times I get severe headaches. At times I'm too weak to walk and at times it is difficult to get sleep (NAN20).*

Comorbidities such as hypertension were also reported by the study participants. One participant reported that hypertension made her weak and unable to perform the activities of daily living.

> *Swahili: Mto wangu, kile ambacho kinakizuia kutiririka vizuri ni shinikizo, nashindwa kufanya kazi yangu, na sasa wakati shinikizo langu linapoenda juu mimi nashindwa kufanya kazi zangu za kawaida.*
> *English: My river fails to flow well because of high blood pressure which causes me not to perform my usual duties (NAN19).*

NAN9 remembered that he had once been admitted to hospital with fractures, which caused him to lack the ability to do self-care.

> *Swahili: Wacha nikumbuke … Siku moja nilikuwa na operesheni, nillikuwa nimepata ajali ya pikipiki, halafu hii mifupa ikatengana, diski, halafu mimi nililazwa kwenye hospitali ya Mp Shah. Hiyo ndio inayoonyeshana.*
> *English: Let me remember … one day I had an operation, I had gotten a motorbike accident, then these bones [inter-vertebral discs] separated, discs, then I was admitted in MP Shah Hospital. That is what it means, and I could not move myself (NAN9).*

Of the 10 male participants in this study, only one opened up to discuss how he perceived diabetes management affecting his sexual function. He indicated that he was experiencing erectile dysfunction because of taking metformin.

> *Swahili: Tangu nipate huu ugonjwa wa kisukari nilianza kutumia dawa ziitwazo metformin, na hio dawa inapunguza nguvu za kiume. Hio shida bado ipo kwa sababu bado natumia hiyo dawa.*
> *English: Since I got this disease of diabetes, I started using medicine called metformin, and that medicine reduces male power. That problem is still there because I'm still using that medicine (NAN9).*

NAN4 described diabetes-related hypertension as *a tree that fell in his river*; this means that hypertension was obstructing his river flow. NAN19 stated that weakness that was associated with hypertension *prevented her river from flowing well*. The participants used the metaphor of stones to represent various diabetes complications, physical states and comorbidities. For instance, *stones* were drawn to represent old age (NAN15), eye problems (NAN17), lack of energy (NAN21) and hyperglycaemia (NAN18 and NAN20). NAN16's informant drew a *crocodile* to denote old age.

Diabetes complications and comorbidities were found to be common in people with diabetes in four LMICs, namely Indonesia, Peru, Romania and South Africa (Soetedjo *et al.*, 2018, p. 1121). Comorbidity of people with diabetes in Ethiopia was one of the variables that was strongly associated with poor DSM (Wolderufael and Dereje, 2021, p. 4). A retrospective study in Ghana determined that there was a strong correlation between diabetes and lower-limb amputations (Sarfo-Kantanka *et al.*, 2019, pp. 4–5). The authors of this study argue that the high incidence of lower-limb amputations for people with diabetes is an indication of poor self-care practices, which results in severe diabetes comorbidities and complications. People with diabetes who experience diabetes complications and comorbidities could end up feeling weak and frail (Onder *et al.*, 2018, p. 49), and they may not have the physical strength to perform DSM practices – this was reported by some of the Kenyan participants with diabetes in this study.

5.4 SUMMARY AND EXTRACTION OF DESIGN REQUIREMENTS

This section will present a brief summary of the findings of the group discussions using Kawa river model, alongside the DRs that emerged. The integration of these DRs and the PDRs reported in Chapter 4 will also be discussed, and a final list of DRs will be presented. This section will end with a brief conclusion for Chapter 5.

5.4.1 Summary of KAWA group discussion findings and design requirements

In order to extract DRs for a product that will enable DSM of adult people with diabetes in Kenya, the context-specific data derived from Kawa group discussions were integrated into six groups of findings. This integration of the findings identified the following areas:

- Financial demands of effective DSM
- Food choices/food availability/food security
- Support networks
- Shortage of health care providers/supplies/self-care resources
- Diabetes-related stress/other emotional influences
- Comorbidities/diabetes complications

After the integration of the findings, the financial demands of effective DSM were found to affect the majority of the participants.

The financial enabler of DSM most commonly acknowledged by the participants was the financing of diabetes services by the NHIF. The majority of the participants who had subscribed as NHIF members indicated that this fund assisted them by paying their hospital bills and enabling them to acquire some of the drugs they needed. Metaphors used to illustrate NHIF support includes *trees in the river, well flowing river* and *a place of crossing over*. In contrast, one of the financial determinants that hindered DSM was lack of money, which participants attributed to unemployment, diabetes-related weakness that caused inability to work, and loss of business due to the Covid-19 pandemic. Lack of money meant the participants could not afford the recommended food, medication or self-

care resources. Lack of money was represented by various metaphors, such as *stones, crocodiles that dried up the river*, *snakes that were blocking the river* and *a tree that has fallen in the river*. These findings are congruent with that of other studies in LMICs, where the majority of people with diabetes, who lacked money, experienced inadequate DSM (Abate *et al.*, 2021, p. 16; Aniedi *et al.*, 2020, p. 428; Aminde *et al.*, 2019, p. 5; Ebere *et al.,* 2017, p. 3). Participants who lacked money faced challenges relating to affording out-of-pocket payment for health care services.

Out-of-pocket payment was found to be a barrier to DSM by the study participants. Those who paid for diabetes services out of their pockets could not afford to buy drugs or attend scheduled diabetes clinics. This was the case in other studies too, where those who had to pay for diabetes services using their own money experienced catastrophic health care expenditure (Oyando *et al.*, 2019, p. 305; Zeng *et al.*, 2018, p. 309). Consequently, participants in the current study and other, related studies, could not afford to buy other DSM-related requirements, which rendered DSM impractical. Some of the metaphors that were used to illustrate out-of-pocket payments include *many stones, a big stone,* and *water flowing badly.* Participants who paid for services out of their pockets also expressed concerns about diabetes management being costly.

The high cost of diabetes management, especially at private hospitals, restricted DSM, and meant participants were unable to afford diabetes medication and self-care resources. Literature indicates that diabetes management is generally costly in many settings, and this affects DSM practices (Pastakia *et al.*, 2017, p. 255; Suglo and Evans, 2020, p. 13; Zimmermann *et al.*, 2018, p. 2). Metaphors that were used to illustrate the high cost of diabetes management are *crocodiles, stones* and *the river becoming narrow*. Some of the participants perceived NHIF premiums to be a barrier to enrolment in the fund, and limiting access to health care services.

Although some participants were aware of the county government's offer to pay NHIF premiums for people with diabetes, not all their colleagues were aware of it, and they did not, thus, all benefit from this offer. This inability to afford NHIF subscriptions was also observed in another Kenyan study, where participants reported that NHIF premiums were

unaffordable and they could not join the scheme (Wanjiru *et al.,* 2019, p. 38; Barasa *et al.*, 2017, p. 7). The following DR was extracted from these results on the financial demands of effective DSM.

DR 1: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management

Food choices, food availability and food security were also identified as areas of concern by the study participants. Just like in other LMICs (Ketema *et al.*, 2020, p. 7; Musee *et al.*, 2016, p. 31), some participants in the current study indicated that they chose to eat healthy food as part of their self-care practices. Those who chose healthy food were knowledgeable about the recommended diet and they reported that healthy food choices aided them to achieve glycaemic control. These participants used the metaphor of *fish in the river* to illustrate choosing healthy food. In addition to choosing healthy food, home food availability was also identified as a DSM enabler. The majority of the participants stated that they obtained their food from their own farms, and illustrated this metaphorically by drawing *trees in their rivers*. This finding is supported by other studies, where access to food from participants' own gardens was a strong DSM enabler (Auma *et al.*, 2020, p. 8; McAtee *et al.,* 2020, p. 1; Ravi *et al.*, 2018, p. 6).

However, some participants reported that they experienced food shortages. Participants who experienced food shortages indicated that they experienced difficulty finding the recommended food, and they ended up eating inappropriate food. These results are supported by literature, which stipulates that environmental changes are likely to be associated with supply shortages of food (Auma *et al.*, 2020, p. 8). Literature also indicates that people with diabetes who rely on food outlets could lack food if they do not have money to buy it (Auma *et al.*, 2020, p. 9). Lack of food variety could also lead to people with diabetes depending on one type of food, and this could contribute to an inadequate diet (Kiguli *et al.*, 2019, p. 6). Participants *drew stones, small stones, snakes and frogs in their rivers* to represent food shortages. The following DR was extracted from these results.

DR 2: A product that will enable diabetes self-management by adults in Kenya should address challenges associated with food choices, food availability and food security in a practicable and executable manner

Participants of this current study also indicated that support networks influenced their DSM. Study participants indicated that they received family/social support, such as assistance with transport to clinics, performance of activities of daily living, meal preparation, financial assistance and moral support. In addition to family/social support, peer support also emerged as an important approach to enhancing DSM of Kenyan people with diabetes. Peer support activities undertaken by the participants included blood glucose monitoring, peer education, and counselling. Support from hospitals/health care providers was also identified as enhancing DSM, by educating and counselling people with diabetes on DSM.

Similarly, other studies found that family/social and peer support are dominant enablers of DSM (Akyoo *et al.*, 2019, p. 35374; Debussche *et al.*, 2018, p. 8; Gurmu *et al.*, 2018, p. 5; Ravi *et al.*, 2018, p. 8; Suglo and Evans, 2020, p. 13). Some of the studies that had been conducted in LMICs report support from health care providers as enablers of DSM (Hailu *et al.,* 2019, p. 2497; Siddique *et al.*, 2017, p. 6), while others report that support from health care providers was perceived as inadequate (Kavinguha, 2017, p. 61; Martyn-nemeth *et al.,* 2020, p. 10; Nang *et al.,* 2919, p. 7; Zimmermann *et al.*, 2018, p. 10). Kawa metaphors that refer to support networks are the following: *Trees by the river side, a big, nice tree, and reducing stone sizes in the river*. The metaphor, *tree by the river side* was used to demonstrate peer support, while *a bridge/trees by the river side* referred to help received from health care providers.

Although the majority of the participants reported that they received support from their families, peers and health care providers, some of them indicated that they experienced lack of family/social support. Perceived lack of family/social support was seen as a barrier to DSM by Kenyan people with diabetes, just as in other LMICs (Mogre *et al.,* 2019, p. 2301). Some participants who experienced strained relationships spoke about lack of support by their spouses, who caused them to experience stress (Cooper *et al.*, 2018, p.

11). In the current study, one of the participants stated that his family depended on him for support, and this negatively impacted on his DSM. Lack of family/social support was indicated through metaphors such as *water not flowing well, crocodiles in the river* and *stones.* The following DR was extracted from these results.

DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input

Shortage of health care providers/supplies and self-care resources was identified as a barrier to DSM. Some participants indicated that a shortage of health care providers caused them to lack knowledge on self-care practices. In addition, the majority of the participants were disappointed because they did not receive sufficient prescribed drugs, insulin syringes, strips and glucometers from the hospital pharmacy. This meant that participants who had paid-up NHIF premiums were expected to buy the supplies using their own money. Literature from other studies done in Kenya and other LMICs indicate that staff shortages and a lack of resources and diagnostic equipment at hospitals was a major hindrance to DSM (Abrahams *et al.*, 2019, p. 5; Ugwu *et al.*, 2020, p. 79; Usman and Pamungkas, 2018, p. 10; Zimmermann *et al.*, 2018, p. 11). Metaphors used to illustrate the shortage of health care providers and hospital supplies included *small stones, a crocodile* and *a small hill in the river.* The following DR was derived from these findings.

DR 4: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context

Stress and other emotional influences were identified as affecting the DSM of the study participants. Several study participants stated that they had experienced diabetes-related stress. Causes of stress included Covid 19-related challenges, the experience of living with a family member with diabetes, increased family responsibilities, lack of employment, and financial constraints. A different view was realised in another study, which reports

that employment in Malaysia was associated with stress in people with diabetes (Fisekovic Kremic, 2020, p. 59). In general, these findings concur with literature, which indicates that people with chronic illnesses, including diabetes, are prone to stress (Hackett and Steptoe, 2017, p. 551; Zimmermann *et al.*, 2018, p. 9).

Some of the participants in the current study reported that they had applied a variety of approaches to overcome stress, such as religious activities and engagement in the activities of daily living. Emotional resilience also manifested in the discussion, as an approach to stress management and enhancement of DSM. Related literature that was reviewed reports similar findings, namely that effective stress management was necessary to enhance DSM (Abrahams *et al.*, 2019, p. 4). Participants used different metaphors, such as *stones,* to illustrate stress, *church buildings next to the rivers,* to illustrate religious activities, and *a well flowing river/slope in the river/a continuing river,* to illustrate effective stress management. Challenges related to Covid-19 were represented using metaphors such as *a very big stone, dirty/muddy water* and *a big wall in the river.* Stress and its related effects were likened to *turbulence in the river.*

In addition to stress, some participants in this current study expressed fears and denial of diabetes at the time of diagnosis. For some of the participants, having lived with a family member who had diabetes contributed to their fear of diabetes and associated complications. Fear and denial caused newly diagnosed patients to delay uptake of DSM. This was also found by several studies conducted elsewhere (Abrahams *et al.*, 2019, p. 3; Hushie, 2019, p. 226; Suglo and Evans, 2020, p. 7).

DR 5: A product that will enable diabetes self-management by adults in Kenya should seek to facilitate the identification and management of diabetes-related stress, fears and denial using culturally congruent approaches

Finally, the health and physical state of the participants, which manifested mainly as comorbidities and complications, were found to affect DSM. Diabetes complications that were identified in the discussions included eye problems, high blood pressure, high blood glucose, renal failure and erectile dysfunction. Participants who experienced diabetes complications mainly indicated that they experienced lack of energy to carry out self-care practices. Participants' physical state, such as old age, was seen to contribute to general body weakness and inability to perform DSM. Diabetes complications were also found to impair the DSM of people with diabetes in other LMICs (Soetedjo *et al.*, 2018, p. 1121; Wolderufael and Dereje, 2021, p. 4). The following DR was extracted from these findings.

DR 6: A product that will enable diabetes self-management by adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities

5.4.2 Integrating PDRs and DRs from the scoping review and Kawa group discussions

In this section, the PDRs that emerged from the literature overview in Chapter 2 and the scoping review in Chapter 4 will be integrated with DRs derived from context-specific data from the Kawa group discussions in Chapter 5 (see Figure 5.1)

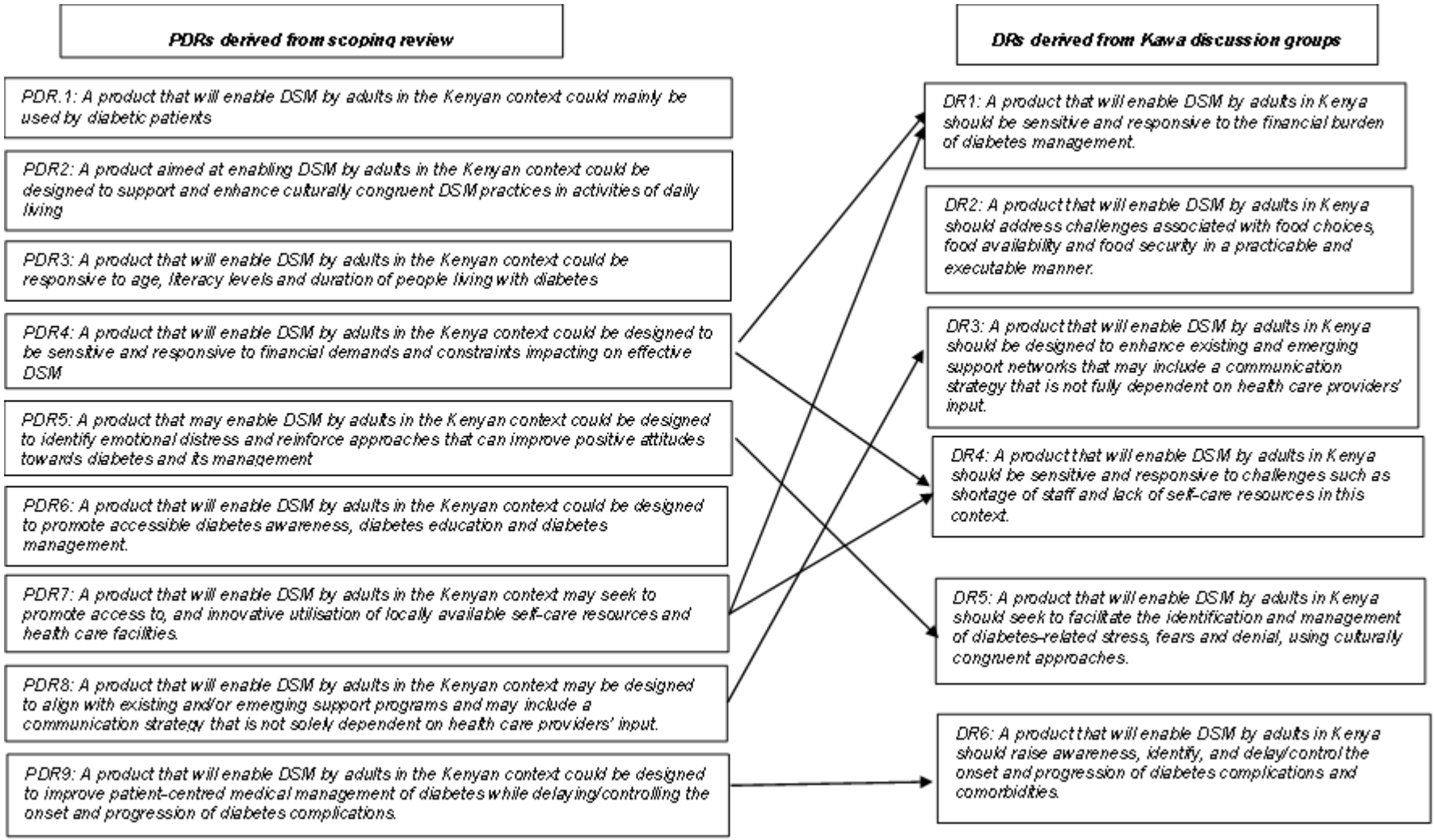

Figure 5.1: Integration of PDRs from the scoping review and DRs from Kawa group discussions

Figure 5.1 illustrates the three scenarios that emerged from the integration of the PDRs and the DRs. In the first scenario, the majority of the PDRs (PDRs 4, 5, 7, 8 and 9) are linked to five DRs (DRs 1, 3, 4, 5 and 6) (*cf.* Figure 5.1). This scenario implies that Kenyan people with diabetes experience similar enablers and barriers to effective DSM, as people with diabetes from other LMICs do. These DRs that are supported by PDRs will form part of the final DRs of a product that will enable DSM by adults in Kenya.

The second scenario, which was realised from this integration, is that PDRs 1, 2, 3 and 6 are not associated with any of the DRs. The interpretation of this scenario is that the Kenyan participants of this study's group discussions provided no evidence to support PDRs 1, 2, 3 and 6. These PDRs focus on the primary users of the product, support of culturally congruent practices in activities of daily living, responsiveness to age, literacy level/education of people living with diabetes, and promotion of accessible diabetes awareness, diabetes education and diabetes management respectively. It could be argued that participants may have overlooked possible enablers/barriers to effective DSM that relate to these PDRs. Alternatively, the factors that are discussed in the literature under these PDRs may not be relevant for adult people with diabetes in Kenya. Therefore, these four PDRs formed part of the content of the questionnaire (*cf.* Addendum 11) that was used in the survey for health care providers, in order to determine their applicability to the Kenyan context.

The last scenario that was realised is that DR 2 was not supported by any PDR. This implies that the participants of the current study discussed issues related to food choices, food availability and food security, but that these topics have not been captured by literature. The researcher will seek to ground this DR, by data from a survey for health care workers. Regardless of whether the survey results support this DR, it was included in the final list of DRs. This is because this DR is derived from the views of potential key users of the desired product that will enable DSM by adults with diabetes in Kenya.

Section 5.4.3 will discuss the final DRs derived from integrating the PDRs in Chapters 2 and 4, and the DRs of Chapter 5.

5.4.3 Final DRs for a product that will enable DSM by adult people with diabetes in Kenya

The final list of DRs in this chapter comprises the following.

> *DR 1: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management*
>
> *DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input*
>
> *DR 4: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context*
>
> *DR 5: A product that will enable diabetes self-management by adults in Kenya should seek to facilitate the identification and management of diabetes-related stress, fears and denial using culturally congruent approaches*
>
> *DR 6: A product that will enable diabetes self-management by adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities*

5.5 CONCLUSION

In conclusion, Chapter 5 started with a brief introduction to the Kawa river model and how this technique was applied to the Kawa discussions of this study. Findings of the Kawa discussions were provided under the two themes that emerged. The themes and their supporting categories were listed and defined. Each of the categories is supported by codes(s) that were discussed in detail. The discussion of the codes was strengthened

further by quotes by the participants and descriptions of the metaphors they used. The discussion on the emerging codes was placed in context by referring to relevant literature. Following this discussion, a brief summary of the chapter was presented, and the six DRs were extracted. The emerging DRs were integrated with the PDRs listed in the scoping review of Chapter 4. This chapter concludes with a list of the final DRs that will inform the content and design of a DSM product for Kenyan adults. PDRs and DRs that did not support each other formed a part of the basis of a survey questionnaire, the findings of which will be discussed in Chapter 6.

CHAPTER 6
SURVEY FINDINGS

6.1 INTRODUCTION

This chapter will discuss the findings of the survey that was conducted among health care providers who attended to patients diagnosed with diabetes at two hospitals in two geographically distinct regions of Kenya. The survey was conducted to finalise the contents and explore the practicability of a DSM product for adults in Kenya (*cf.* 1.5). The survey comprised a self-administered questionnaire (*cf.* Addendum 14). Descriptive analysis of the survey findings was done and will be presented using tables and figures, such as pie charts and graphs. Descriptive data derived from respondents at the two study sites will be presented jointly, since comparing study sites was not the purpose of the survey. The total number of respondents who participated in this survey was 102. However, since not all respondents responded to all questions, for unknown reason(s), the total number of respondents (n value) for different questions varies. In each section, the n value will be provided to indicate the number of respondents who completed a specific question in the different sections.

Data presentation will begin with a brief introduction to the study questionnaire that was used to collect data. The next section to be presented will describe the demographics of the respondents. The demographics that will be discussed are respondents' professional discipline, workstation, and duration of experience in providing care to patients with diabetes. After presenting the demographic data, this chapter will present data on the contents of a product that will enable DSM by adults in Kenya. This section contains data in two specific areas; first, factors that influence adult DSM, while the second area is on the content that should be included in the product.

The next data that will be presented in this chapter is data on the format of a product that will enable DSM by adults in Kenya. This data will comprise the details of the format of a product that can enhance DSM by adults, and the most effective format for a product that can enhance DSM by adults in Kenya. The next section will present data on the mode of

use of a product that will enable DSM by adults in Kenya. Data from each of these sections will be presented alongside the corresponding DRs that have already been formulated. Some of the findings support the PDRs of Chapter 4 that are not supported by data reported in Chapter 5 (*cf.* Figure 5.1). Consequently, these PDRs were extrapolated to become additional DRs. Finally, conclusions of this chapter will be presented.

6.2 STRUCTURE OF THE RESEARCH QUESTIONNAIRE

The research questionnaire (Addendum 11) that was used to collect data via a survey contained four sections, namely, demographics of the health care providers, contents, format, and mode of use of a product that will enable DSM by adults in Kenya. Each of the questionnaire sections was divided into respective subsections, which gave rise to the questions listed in Table 6.1.

Table 6.1: Sections of the questionnaire as they align to questions asked

Questionnaire section	Sub-sections of the questionnaire/questions	Questions
1 Demographics	1.1 Professional discipline	1.1.1–1.1.8
	1.2. Workstation	1.2.1–1.2.6
	1.3 Duration of experience	1.3.1–1.3.3
2 Contents of a product that will enable DSM by adults in Kenya	2.1 Factors that influence DSM	2.1.1–2.1.7
	2.2 Information that should be included in a product that will enable a DSM product for adults in Kenya	2.2.1–2.2.21
3 Format of a product that will enable DSM by adults in Kenya	3.1 Details of the format	3.1.1–3.1.10
	3.2 Format that can enhance DSM by adults in Kenya	3.2.1–3.2.7
4 Mode of use of a product that will enable DSM by adults in Kenya	4.1 Mode of use of the product	4.1.1–4.1.12

Data from the sections and subsections of the questionnaire will be discussed in a systematic manner, with demographic data being the first topic to be presented.

6.3 DEMOGRAPHICS

Demographic data that will be presented in this section comprise that on professional disciplines of the respondents (question 1.1), their workstations (question 1.2), and duration of experience (question 1.3). From a total sample of 102 respondents, 53 (52%) were from Kakamega County Referral Hospital, while 49 (48%) were from Nanyuki County Referral Hospital. The sample was made up of health care providers representing various professional disciplines.

6.3.1 Professional disciplines

Since patients with diabetes receive care from health care providers representing various professional disciplines, it was decided to enrich views that could contribute to a product that will enable DSM by adults in Kenya by conducting a survey amongst representatives of various professional disciplines. In this study, the majority (n=101, 99%) of the respondents reported being engaged in only one professional discipline – most (n=53, 52%) reported being nurses. Other professional disciplines represented were pharmacists (n=12, 11.8%), nutritionists/dieticians (n=12, 11.8%), medical doctors (n=10, 9.8%), clinical officers (n=8, 7.8%), pharmacy technologists (n=4, 3.9%), and counsellors (n=3, 2.9%). One respondent (1%) indicated that, in addition to being a nutritionist, they were also a counsellor and a diabetes educator.

6.3.2 Workstation

The second set of demographic data that was collected and analysed in this study related to workstations, that is, where the health care providers who participated in this study were deployed. Figure 6.1 summarises the workstations of the study respondents.

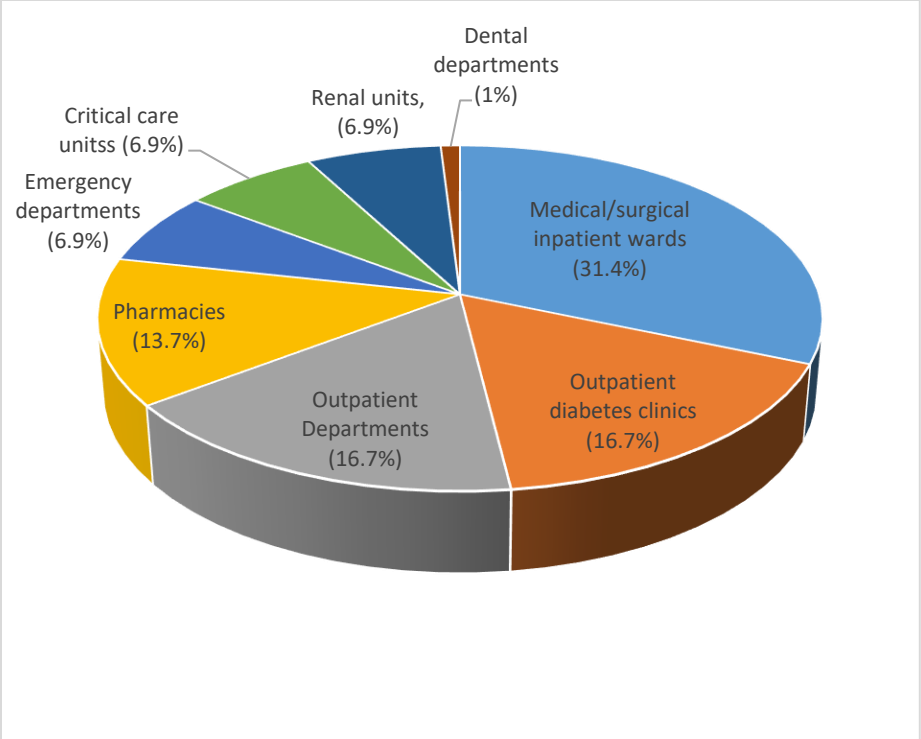

Figure 6.1: Respondents' work stations (n=102)

Out of the total respondents (n=102, 100%) who completed this question, approximately one third (n=32, 31.4%) indicated that they were stationed in inpatient medical/surgical wards. The rest of the respondents reported their workstations as being outpatient diabetes clinics (n=17, 16.7%), outpatient departments (n=17, 16.7%), pharmacies (n=14, 13.7%), emergency departments (n=7, 6.9%), critical care units (n=7, 6.9%), renal units (n=7, 6.9%) or dental departments (n=1, 1%).

Analysis of the data on workstations reveals that people with diabetes are attended to in similar departments at both Kakamega and Nanyuki County Referral Hospitals. The majority (n=91, 89.2%) of the respondents indicated that they provided services to people with diabetes from only one workstation. The remaining respondents (n=11, 10.8%) indicated that they worked at multiple work stations: inpatient medical/surgical wards and outpatient diabetes clinics (n=4, 3.9%), inpatient medical surgical wards and critical care units (n=3, 2.9%), inpatient medical surgical wards, critical care units and renal units (n=1, 1%), inpatient medical surgical wards and outpatient departments (n=1, 1%), outpatient

diabetes clinics and critical care units (n=1, 1%) and critical care units and renal units (n=1, 1%).

Further analysis of data on workstations shows that an equal proportion of medical doctors and nutritionists/dieticians (n=3, 2.9%) worked at multiple workstations. The other respondents who reported to work at multiple workstations were nurses (n=2, 2%), counsellors (n=1, 1%), clinical officers (n=1, 1%), and pharmacists (n=1, 1%).

6.3.3 Duration of experience

The third and the last demographic variable that was investigated by this study is duration of experience of caring for patients diagnosed with diabetes. Table 6.2 illustrates the duration of experience of the respondents.

Table 6.2: Respondents' duration of experience in provision of care to patients with diabetes (n=101)

Duration of experience of providing care to patients with diabetes	n=101	(%)
1 to 5 years	49	48.5%
6 to 10 years	25	24.8%
More than 10 years	27	26.7%
TOTAL	101	100%

Approximately half (n=49, 48%) the respondents indicated that they have been caring for patients diagnosed with diabetes for between one and five years. Further research could reveal the level of skill that these health care providers, who have relatively little work experience, have to support patients diagnosed with diabetes.

6.4 INFORMATION THAT SHOULD BE INCLUDED IN A PRODUCT THAT WILL ENABLE DSM AMONG ADULTS IN KENYA

After enquiring about the demographic factors of the respondents, the next section of the questionnaire related to information that should be included in a product that is intended to enable DSM by adults in Kenya. Two questions were posed to the respondents in this section. The first question, which was derived from literature (*cf.* Table 4.1), aimed at identifying factors that influence DSM by adults in Kenya.

6.4.1 Factors that influence DSM in Kenya

This section focused on factors that influence DSM in Kenya, and enquired how strongly various factors, such as cultural and demographic factors, attitudes of people diagnosed with diabetes towards targets of diabetes/DSM, personality/moods/emotions, individual differences, exposure to media, and exposure to interventions, influenced DSM.

6.4.1.1 The influence of cultural factors on DSM

Respondents were asked to indicate how strongly cultural factors, such as lifestyle, beliefs/norms/values, marital status and religion, influenced DSM. Figure 6.2 presents a summary of how they reported cultural factors influencing DSM.

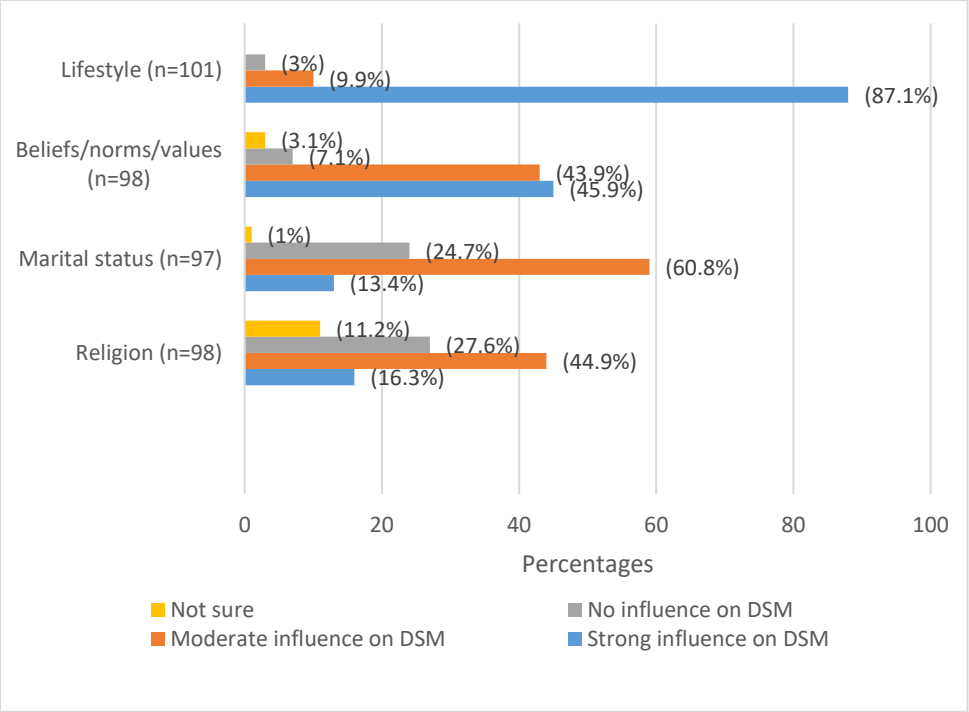

Figure 6.2: Respondents' opinions on how cultural factors influence DSM

The majority (n=88, 87.1%) of the respondents were of the opinion that lifestyle strongly influenced DSM by adults in Kenya. Slightly less than half (n=45, 45.9%) the respondents indicated that cultural beliefs/norms/values strongly influenced DSM, while 43 (43.9%) of them reported that cultural beliefs/norms/values moderately influenced DSM. Marital status was reported by the majority (n=59, 60.8%) of the respondents as having a moderate influence on DSM. The cultural factor that was most frequently reported to have no influence on DSM was religion, with approximately a quarter (n=27, 27.6%) of respondents indicating so; a few (n=11, 11.2%) of the respondents were unsure of the influence of religion on DSM. Although health care providers who participated in the survey did not perceive religion as being a significant influencing factor for DSM, DR 5, which was extrapolated from context-specific data derived from adults with diabetes and reported on in Chapter 5, will be upheld. DR 5 reads as follows.

DR 5: A product that will enable diabetes self-management among adults in Kenya should seek to facilitate early identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.

In addition, the cultural factor that is strongly supported in the literature (*cf.* 4.4) on factors influencing DSM, is lifestyle. As such, PDR 2 (*cf.* Figure 5.1) was adapted and extrapolated to become a DR that focuses on the lifestyle of adults who practice DSM, as follows.

PDR 2: A product aimed at enabling DSM by adults in the Kenyan context could be designed to support and enhance culturally congruent DSM practices in activities of daily living.

↓

DR 7: A product that will enable diabetes self-management among adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations.

6.4.1.2 The influence of demographics on DSM

Respondents were asked to indicate how strongly demographic factors, such as age, gender, education, socio-economic status, family history of diabetes, and physical state/systemic illness, influenced DSM. Figure 6.3 gives a summary of the findings on the influence of demographic factors on DSM.

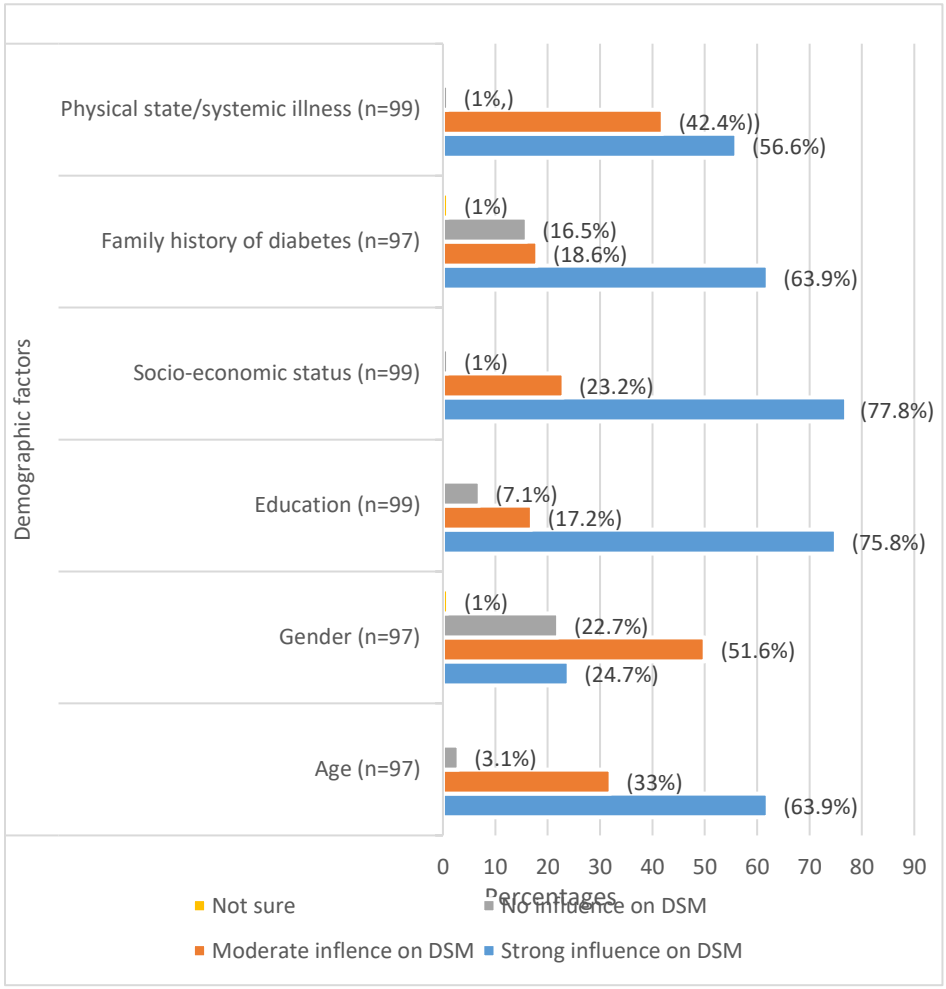

Figure 6.3: Respondents' opinion on the way demographics influence DSM

The majority (n=77, 77.8%) of the respondents indicated that socio-economic status and education (n=75, 75.8%) strongly influenced DSM. The other demographic factors that were reported to have a strong influence on DSM were physical state/systemic illness (n=56, 56.6%), family history of diabetes (n=62, 63.9%) and age (n=63, 63.9%). Gender was the only demographic factor that was reported to influence DSM only moderately, with half (n=50, 51.5%) the respondents indicating this.

These findings support the data in Chapter 4 on demographic factors that influence DSM, such as physical state/systemic illness and family history of diabetes. These demographic factors, together with additional demographic factors, such as education and age, were not supported by data presented in Chapter 5 and obtained from the Kawa group

discussions. Since these demographic factors were reported by the survey respondents to strongly influence DSM, these factors were adapted to strengthen PDR 3 (*cf.* Figure 5.1), which was extrapolated as DR 8, as indicated below.

6.4.1.3 Influence of attitudes towards DSM

This section will investigate the influence of attitudes of people with diabetes towards DSM, such as confidence in own ability to practice DSM, stigma, and attitudes towards diabetes/DSM. A summary of the findings relating to respondents' opinions on the influence of attitudes on DSM is presented in Figure 6.4.

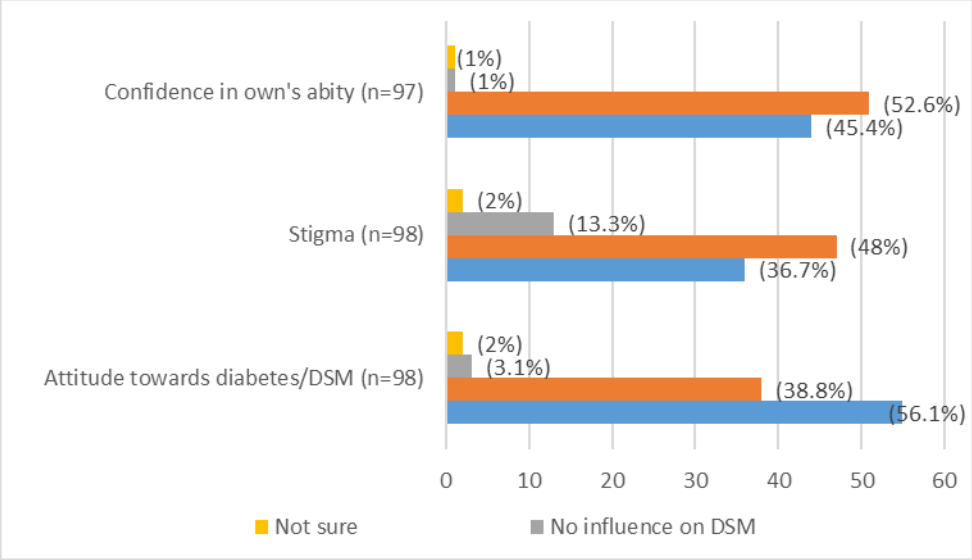

Figure 6.4: Respondents' opinions on the influence of attitudes of people with diabetes on DSM

Slightly more than half (n=51, 52.6%) the respondents were of the opinion that that patients' confidence in their own ability to practice DSM moderately influenced DSM, while 44 (45.4%) indicated that this factor strongly influenced DSM. Approximately half (n=47, 48%) the respondents indicated that stigma moderately influenced DSM while a third (n=36, 36.7%) were of the opinion that stigma strongly influenced DSM. More than half (n=55, 56.1%) the respondents indicated that patients' attitudes towards diabetes/DSM strongly influenced DSM. A moderate influence of attitudes towards

diabetes/DSM was reported by nearly one third (n=38, 38.8%) of the respondents. A minority (n=3, 3.1%) of the respondents reported that attitudes towards DSM had no influence on DSM, while 2 (2%) were not sure if this factor influenced DSM.

In view of these findings, the only attitude-related factor that was reported by the majority of respondents (n=55, 56.1%) to have a strong influence on DSM is attitudes towards diabetes/DSM. In line with this finding, the following additional DR 9 was formulated.

DR 9: A product that will enable diabetes self-management among adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM.

6.4.1.4 Influence of personality/mood/emotions on DSM

The two aspects related to the influence of personality/mood/emotions on DSM that this study enquired about are mental illness/comorbidity and emotions. Respondents reported that mental illness/comorbidity and emotions had an almost similar influence on DSM, as shown in Figure 6.5.

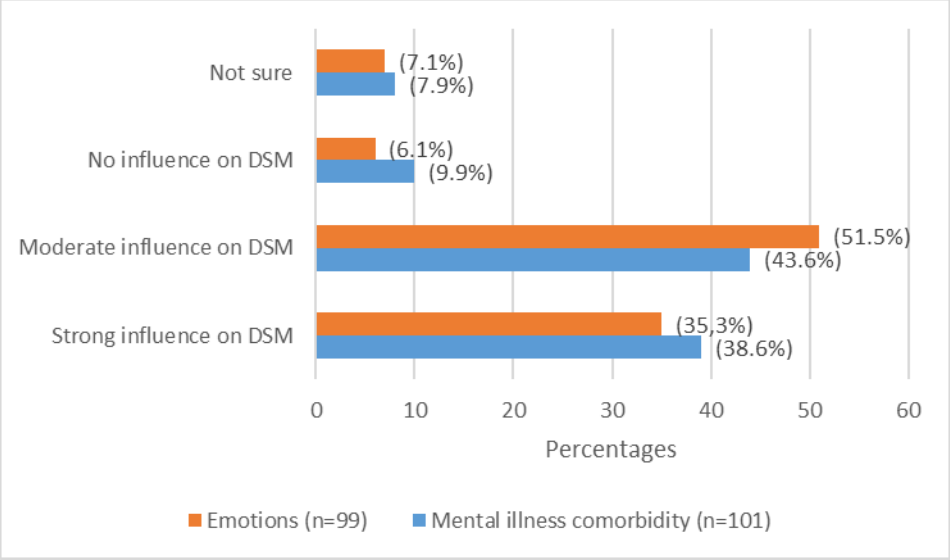

Figure 6.5: Respondents' opinions on the influence of emotions and mental illness/comorbidity on DSM

Slightly less than half (n=44, 43.6%) the respondents reported that mental illness/comorbidity had a moderate influence on DSM, while a strong influence of mental illness/comorbidity on DSM was reported by approximately a third (n=39, 38.6%) of the respondents. Half (n=51, 51.5%) of the respondents were of the opinion that emotions moderately influenced DSM. Slightly more than a third (n=35, 35.3%) of the respondents felt that emotions had strong influence on DSM. It is clear that the survey respondents did not perceive mental illness/comorbidity and emotions as having a strong influence on DSM. However, DR 5, which was extrapolated from data obtained from patients diagnosed with diabetes in Kawa discussions, as reported in Chapter 5, is upheld.

DR 5: A product that will enable diabetes self-management by adults in Kenya should seek to facilitate early identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.

6.4.1.5 Influence of individual differences on DSM

In this section of the survey, respondents were asked to give their opinions on the influence of individual differences on DSM. The two individual differences that were identified are perceived risks of diabetes/diabetes management, and perceived benefits of diabetes management. The findings are illustrated in Figure 6.6.

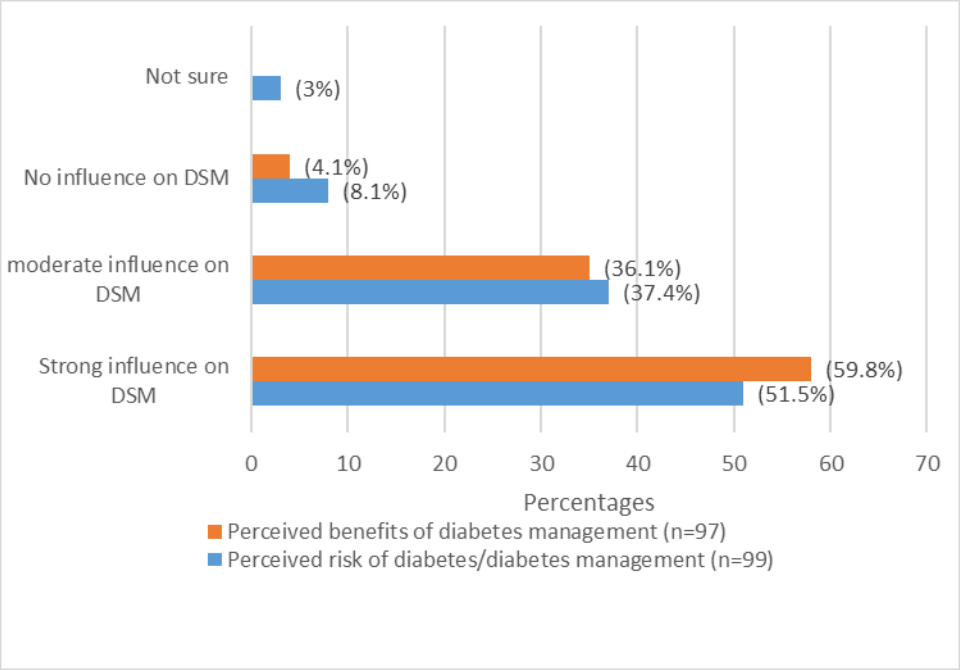

Figure 6.6: Respondents' opinions on the influence of individual differences on DSM

Analysis of this data showed that slightly more than half (n=51, 51.5%) the respondents were of the opinion that perceived risk of diabetes/diabetes management strongly influenced DSM. Similarly, more than half (n=58, 59.8%) the respondents indicated that perceived benefits of diabetes management strongly influenced DSM. More than a third (n=37, 37.4%) of the respondents felt that perceived risk of diabetes/diabetes management moderately influenced DSM, while almost an equal proportion (n=35, 36.1%) of respondents indicated that perceived benefits of diabetes management moderately influenced DSM. Few respondents reported no influence, and being unsure if individual differences influenced DSM.

In summary, a significant proportion of the respondents were of the opinion that perceived risk of diabetes/diabetes management and perceived benefit of diabetes management strongly influenced DSM. This finding is considered relevant and lead to the extraction of the following additional DR, which focuses on diabetes awareness and education.

DR 10: A product that will enable diabetes self-management among adults in Kenya should promote accessible diabetes awareness and education on diabetes management.

6.4.1.6 Influence of being exposed to media on DSM

The questionnaire enquired how two aspects of media exposure, that is, exposure to social media and exposure to mass media, influenced DSM. The findings are illustrated in Figure 6.7.

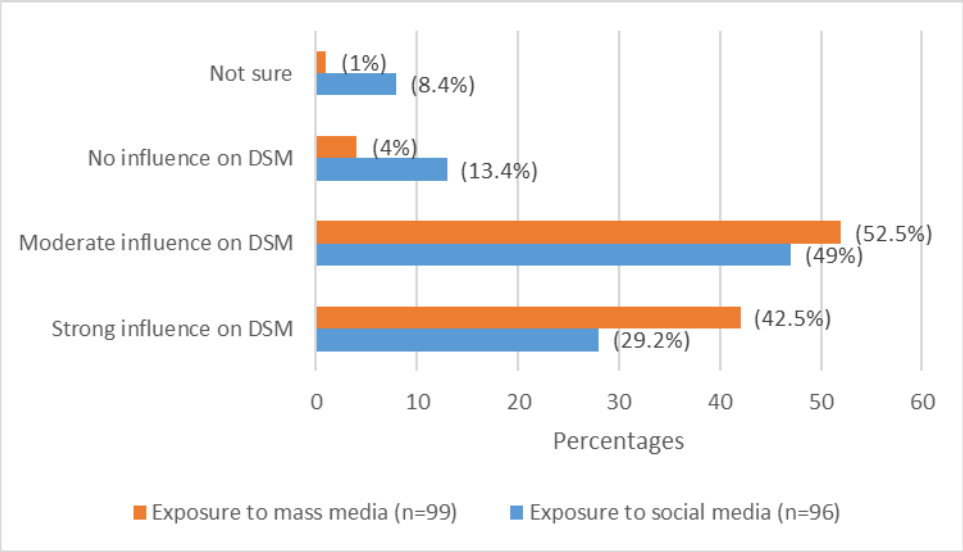

Figure 6.7: Respondents' opinions on the influence of exposure to media on DSM

Exposure to social media was reported to have a strong influence on DSM by approximately a quarter (n=28, 29.2%) of the respondents. Slightly less than half (n=42, 42.5%) the respondents were of the opinion that exposure to mass media strongly influenced DSM. Close to half (n=47, 49%) the respondents indicated that exposure to social media influenced DSM to a moderate extent, while almost a similar proportion (n=52, 52.5%) believed that exposure to mass media influenced DSM to a moderate extent. In view of these findings, exposure to media was perceived as having moderate influence on DSM. This finding will be considered alongside the finding reported on in Section 6.6, on the mode of use of a product that will enable DSM in Kenya.

6.4.1.7 Influence of exposure to interventions on DSM

This survey sought to identify the influence of eight interventions, namely, exposure to alternative medicine, peer support groups, family support, self-care resources, diabetes education/awareness/health promotion, treatment options, cost/infrastructure for interventions and patient/physician relationship on DSM. Findings on the influence of exposure to interventions to DSM are summarised in Figure 6.8.

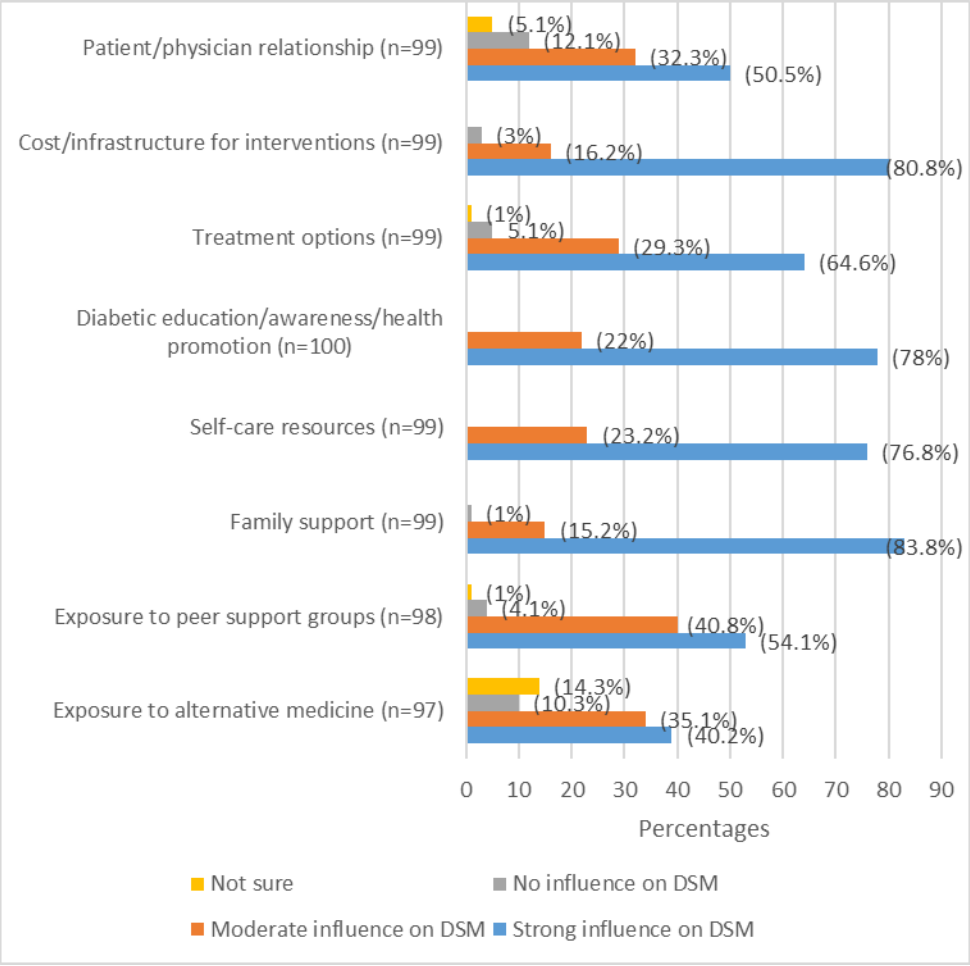

Figure 6.8: Respondents' opinions on the influence of exposure to interventions relating to DSM

Analysis of these findings reveal that, in general, respondents were of the opinion that exposure to interventions had a strong influence on DSM, as follows: cost/infrastructure

for interventions (n=80, 80.8%), treatment options (n=64, 64.6%), diabetes education/awareness/health promotion (n=78, 78%), self-care resources (n=76, 76.8%), family support (n=83, 83.8%), and peer support groups (n=53, 54.1%). The enquiry into the influence of exposure to alternative medicine on DSM lead to a range of responses: 39 of the respondents (40.2%) reported that this factor strongly influenced DSM, while an almost similar proportion (n= 34, 35.1%) indicated that alternative medicine influenced DSM to a moderate extent.

These findings are congruent with the data that was obtained from literature reported in Chapter 4 (*cf.* 4.3.7), as well as data obtained from adults with diabetes in Kawa discussions and reported in Chapter 5 (*cf.* 5.2). This data, therefore, supports the following DRs, which have already been formulated:

DR 1: A product that will enable diabetes self-management among adults in Kenya should be sensitive and responsive to the financial burden of diabetes management.

DR 3: A product that will enable diabetes self-management among adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

In addition, findings on the influence of diabetes education/awareness/health promotion on DSM will be considered to enhance data from the scoping review, and to strengthen PDR 6 (*cf.* Figure 5.1), which was not supported by data provided in Kawa group discussions, as reported in Chapter 5. This data will ground PDR 6 into DR 10, as follows, further.

PDR 6: A product that will enable DSM by adults in the Kenyan context could be designed to promote accessible diabetes awareness, diabetes education and diabetes management.

DR 10: A product that will enable diabetes self-management by adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management.

The survey findings also show that treatment options and self-care resources strongly influence DSM. Therefore, additional DRs, DR 11 and DR 12, were extracted, as follows:

DR 11: A product that will enable diabetes self-management by adults in Kenya should be responsive to treatment options in this context.

DR 12: A product that will enable diabetes self-management by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.

In summary, according to the analysis of the data on distal variables that influence DSM, it is evident that most of the distal variables that were derived from literature (*cf.* Table 4.1), were indicated by respondents of this survey as having either a strong influence or a moderate influence on DSM by adults diagnosed with diabetes in Kenya. Having established how these distal variables influence DSM, the researcher will proceed to the next section of this chapter, which will focus on the importance of specific information that is closely related the aforementioned distal variables (*cf.* 6.4.1) in a product that will encourage DSM in Kenya.

6.4.2 Information that should be included in a product that is intended to enable DSM by adults in Kenya

This section will report on respondents' views as provided when they were asked to indicate their opinions on the importance of the presented information in a product that aims to enable DSM by adults in Kenya. For ease of interpretation, data on information that should be included in a product that is aimed at enabling DSM by adults in Kenya will be grouped and discussed in five sections, namely, information on cultural factors, demographics, attitudes towards diabetes/DSM, mental illness/comorbidities, and exposure to interventions.

6.4.2.1 Importance of cultural information in a product that is intended to enable DSM by adults in Kenya

In this section, respondents were asked to give their views on the importance of information on cultural factors in a product that is aimed at enabling DSM. Specific information (*cf.* Addendum 14) on cultural factors, such as lifestyle, which comprised blood glucose monitoring, drug adherence, physical activity and dietary lifestyle modification was requested in this section. Information on two other cultural factors – cultural beliefs/values/norms, and religion (*cf.* Addendum 14) – was also solicited. Figure 6.9 gives a summary of the importance of information on cultural factors in a product that is intended to enable DSM in Kenya.

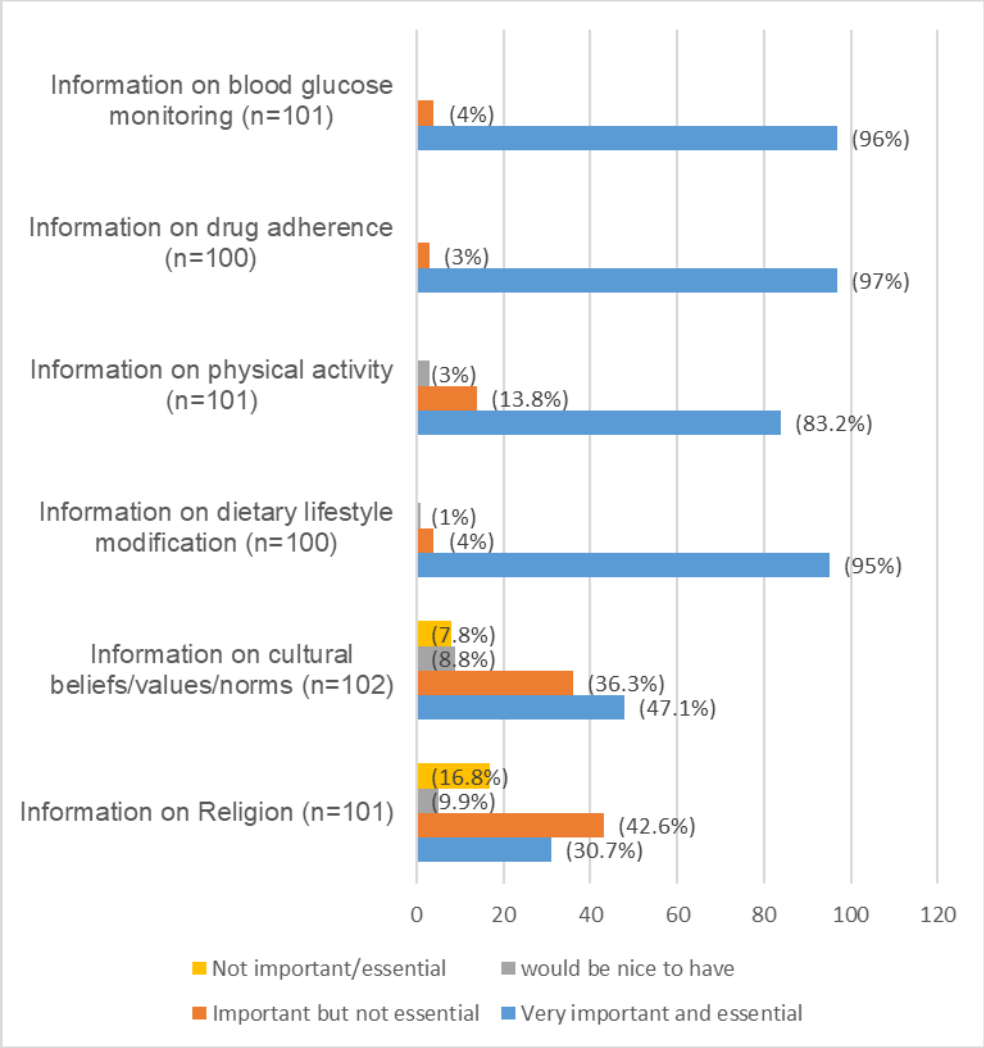

Figure 6.9: Respondents' opinions on the importance of cultural information in a product that is intended to enable DSM in Kenya

Information on culturally determined lifestyle factors, which include blood glucose monitoring, drug adherence, physical activity and dietary lifestyle modification, was reported to be very important and essential by the respondents: blood glucose monitoring (n=97, 96%), drug adherence (n=97, 97%), physical activity (n=84, 83.2%) and dietary lifestyle modification (n=95, 95%). The respondents' views on the importance of the proposed information in a product that is intended to enable DSM, is congruent with these respondents' previously expressed opinions on factors that influence DSM (*cf.* 6.4.1.1). This finding supports DR 7, which reads as follows:

DR 7: A product that will enable diabetes self-management among adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations.

In contrast, less than half the respondents (n=48, 47.1%) indicated that information on cultural beliefs/values/norms (*cf.* Addendum 11) was very important and essential, while less than a third (n=31, 30.7%) believed that information on religion was very important and essential. These findings reveal that respondents did not regard information on cultural beliefs/values/norms and religion as very important and essential for a product that is intended to enable DSM in Kenya. Similarly, as Chapter 5 reported, cultural beliefs/norms/values were not discussed by patients with diabetes in Kawa groups. However, adults with diabetes indicated, as reported in Chapter 5, that religious practices, such as praying and going to church, in particular, were associated with stress management. As such, DR 5, which refers to stress management, enshrines these cultural practices (religious practices). DR 5 is, therefore, upheld.

DR 5: A product that will enable diabetes self-management among adults in Kenya should seek to facilitate early identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.

6.4.2.2 Importance of information on demographics in a product that is intended to enable DSM by adults in Kenya

Survey respondents were asked to indicate whether information on demographic factors (*cf.* Addendum 14), such as physical state/systemic illness, socio-economic factors, duration of illness, education, gender and age, was important to be included in a product that is aimed to enable DSM by adults in Kenya. Figure 6.10 presents the findings of this enquiry.

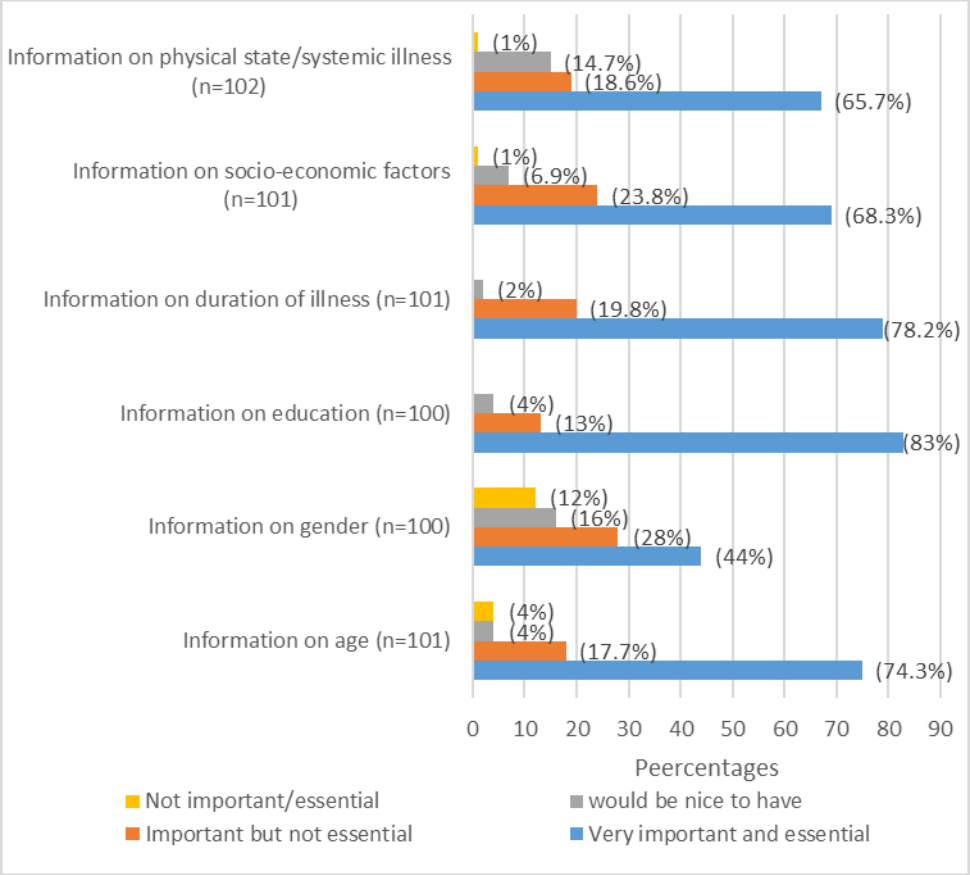

Figure 6.10: Respondents' opinions on the importance of information on demographics in a product that is intended tol enable DSM in Kenya

It is evident in Figure 6.10 that information on demographic factors, such as a physical state/systemic illness (n=67, 65.7%), socioeconomic factors (n=69, 68.3%), duration of illness (n=79, 78.2%), education (n=83, 83%) and age (n=75, 74.3%), was generally seen as very important and essential for inclusion in a product that is intended to encourage DSM in Kenya. The only demographic factor that the respondents did not consider essential is gender: less than half (n=44, 44%) indicated that information on gender was very important and essential in a DSM product. This data concurs with the respondents' views on the influence of demographics on DSM (*cf.* 6.4.1.2) – they reported that all the demographic factors, except gender, strongly influenced DSM. This data supports DR 8.

DR 8: A product that will enable diabetes self-management among adults in Kenya should be responsive to physical state/systemic illness, family history of diabetes, socio-economic status, education and age of people diagnosed with diabetes.

6.4.2.3 Importance of information on attitudes towards diabetes/DSM in a product that is intended to enable DSM by adults in Kenya

In this section of the survey, respondents were asked to indicate their opinions on how important information on attitudes towards diabetes/DSM and confidence in own ability to do DSM would be in a product that will enable DSM by adults in Kenya. These two factors will be presented separately, with the first factor, that is, attitudes towards diabetes/DSM, being presented first.

i) Respondents' opinions on the importance of information on attitudes towards diabetes/DSM in a product that is intended to enable DSM

Respondents were asked to indicate their opinions on two matters relating to importance of information on attitudes towards diabetes/DSM in a DSM product. The first question focused on the importance of information that aims to improve attitudes about diabetes/DSM. The second question was on the importance of information in a DSM product that addresses negative attitudes/stigma relating to diabetes/DSM. Figure 6.11 presents the respondents' opinions.

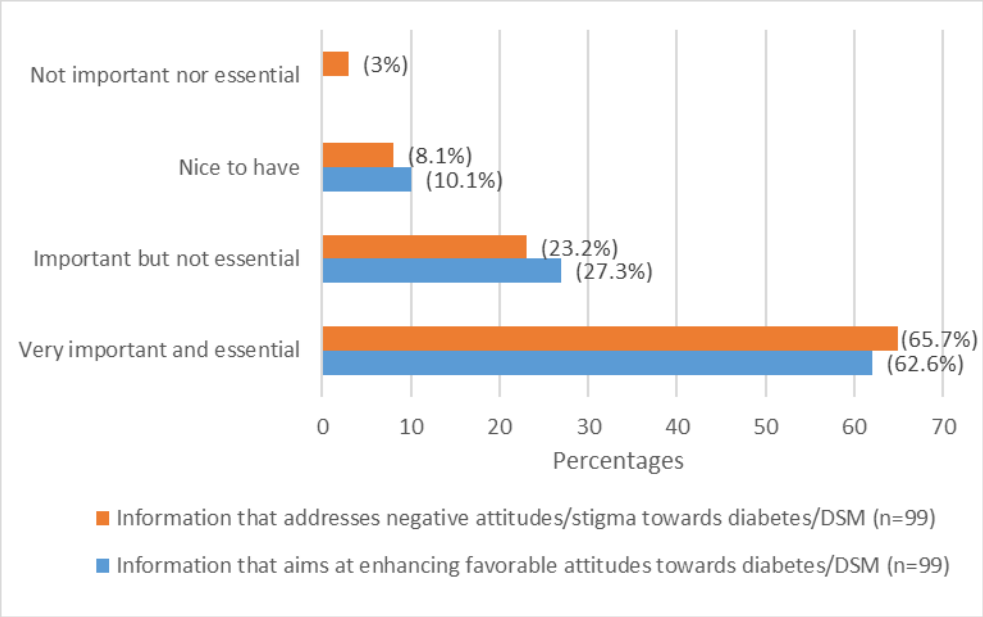

Figure 6.11: Respondents' opiniona on the importance of information on attitudes towards diabetes/DSM in a product that is intended to enable DSM

The majority (n=65, 65.7%) of the respondents were of the opinion that it was very important and essential to include information that would address negative attitudes/stigma towards diabetes/DSM in the product. Similarly, 62 (62.6%) of the respondents indicated that it was very important and essential to include information in the product that would enhance favourable attitudes towards diabetes/DSM. This information supports DR 9, which has already been formulated, as follows

DR 9: A product that will enable DSM by adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM.

ii) Importance of information on confidence in own ability to do DSM in a product that is intended to enable DSM

In this section, respondents were asked to indicate their opinions on the importance of having a section that will promote periodic review of confidence in one's own ability to practice DSM. Figure 6.12 demonstrates the respondents' views.

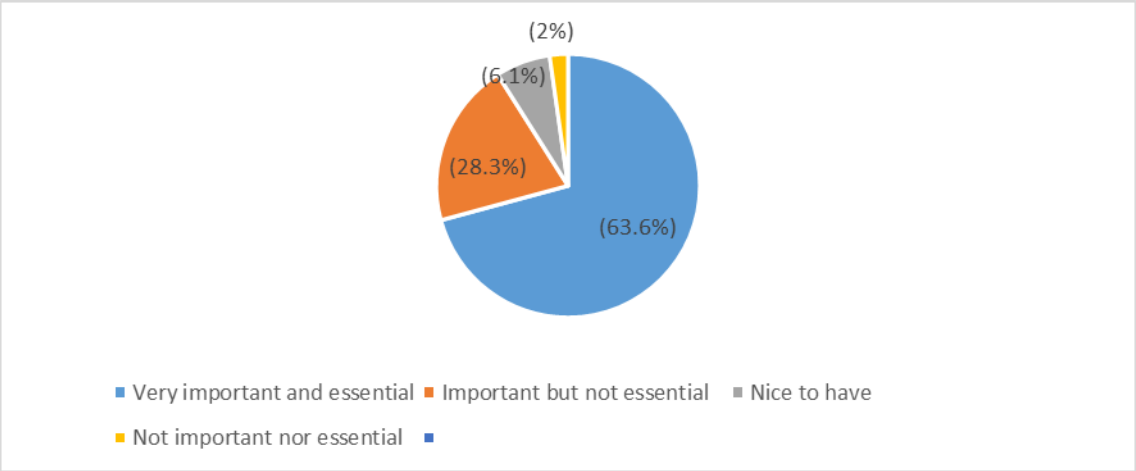

Figure 6.12: Respondents' (n=99) opinions on the importance of having a section on periodic evaluation of confidence in one's own ability to do DSM

The majority (n=63, 63.6%) of respondents were of the opinion that it is very important and essential to have a section in the product on periodic evaluation of confidence in one's own ability to practice DSM. This data was considered in the formulation of an additional DR, DR 12, which stipulates the necessity of having an evaluation section in the product, as indicated below.

DR 13: A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and patient's confidence in DSM.

6.4.2.4 Importance of information on mental illness/comorbidities in a product that is intended to enable DSM by adults in Kenya

In this section, respondents were asked to give their opinions on the importance of information on diabetes-related mental illness, and information to encourage patients with diabetes to develop innovative approaches to handling emotional concerns. Figure 6.13 summarises data that was elicited on these two aspects.

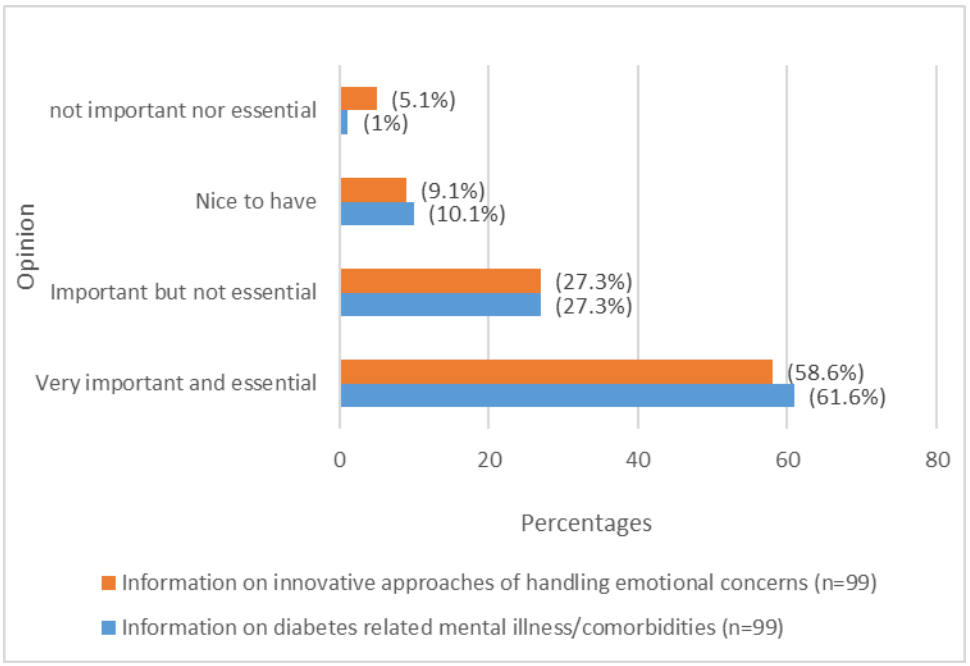

Figure 6.13: Respondents' opinions on the importance of information on mental illness/comorbities in a product that will enable DSM by adults in Kenya (n=99)

The majority (n=61, 61.6%) of the respondents indicated that it is very important and essential to include information on diabetes-related mental illness/comorbidities in a product that is intended to enable DSM. Likewise, the majority (n=58, 58.6%) of the respondents indicated that it was very important and essential to include information that will encourage people diagnosed with diabetes to come up with innovative approaches to handling their emotional concerns. In particular, the innovative approaches should include a cultural component, such as religious activities. The findings relating to opinions on encouraging people diagnosed with diabetes to come up with innovative approaches to handling their emotional concerns supports DR 5, as quoted below.

DR 5: A product that will enable diabetes self-management by adults in Kenya should seek to facilitate early identification and management of diabetes-related stress, fears and denial using culturally congruent approaches.

On the other hand, information on diabetes-related mental illness/comorbidity is not covered by and does not support any of the DRs that have already been formulated. Therefore, DR 14 is derived from these findings.

DR 14: A product that will enable DSM by adults in Kenya should contain information on diabetes-related mental illness and/or other comorbidities.

6.4.2.5 Importance of information that provides exposure to interventions in a product that is intended to enable DSM by adults in Kenya

This section of the questionnaire enquired about the importance of providing information in five areas relating to exposure: a) to peer support, b) to family support, c) to support from health care providers, d) to self-care resources and e) to treatment modalities. Data from each of these five sections will be presented below.

i) Importance of information on exposure to peer support in a product that is intended to enable DSM by adults in Kenya

The respondents were asked to indicate the importance of information on peer support in stress management, peer support activities and how to form and run peer support groups. The findings are summarised in Figure 6.14.

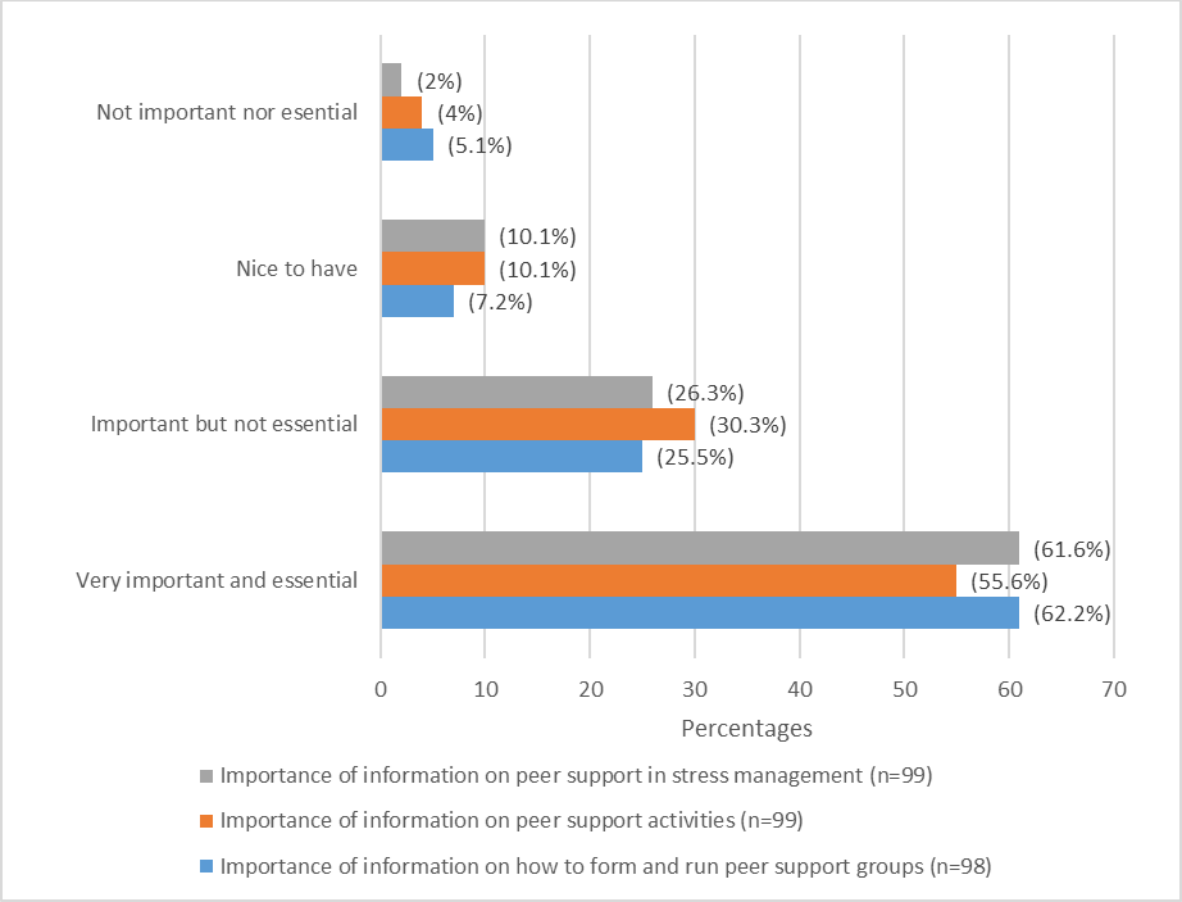

Figure 6.14: Respondents' opiniona on the importance of information on peer support groups in a product that is intended to enable DSM by adults in Kenya

The majority of respondents (n=61, 61.6%) indicated that it was very important and essential to include in the product information on peer support for managing stress. Concerning information on peer support activities, more than half (n=55, 55.6%) the respondents were of the opinion that it is very important and essential to include this information in a product that is intended to enable DSM by adults in Kenya. The majority (n=61, 62.2%) also indicated that it was very important to include information on how to form and run peer support groups. This data strengthens a DR that has already been formulated, DR 3, further; it is presented below.

DR 3: A product that will enable diabetes self-management among adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

ii) Importance of information on family support in a product that is intended to enable DSM in Kenya

Figure 6.15 presents respondents' views on the importance of information on family support in a product that is intended to enable DSM by adults in Kenya.

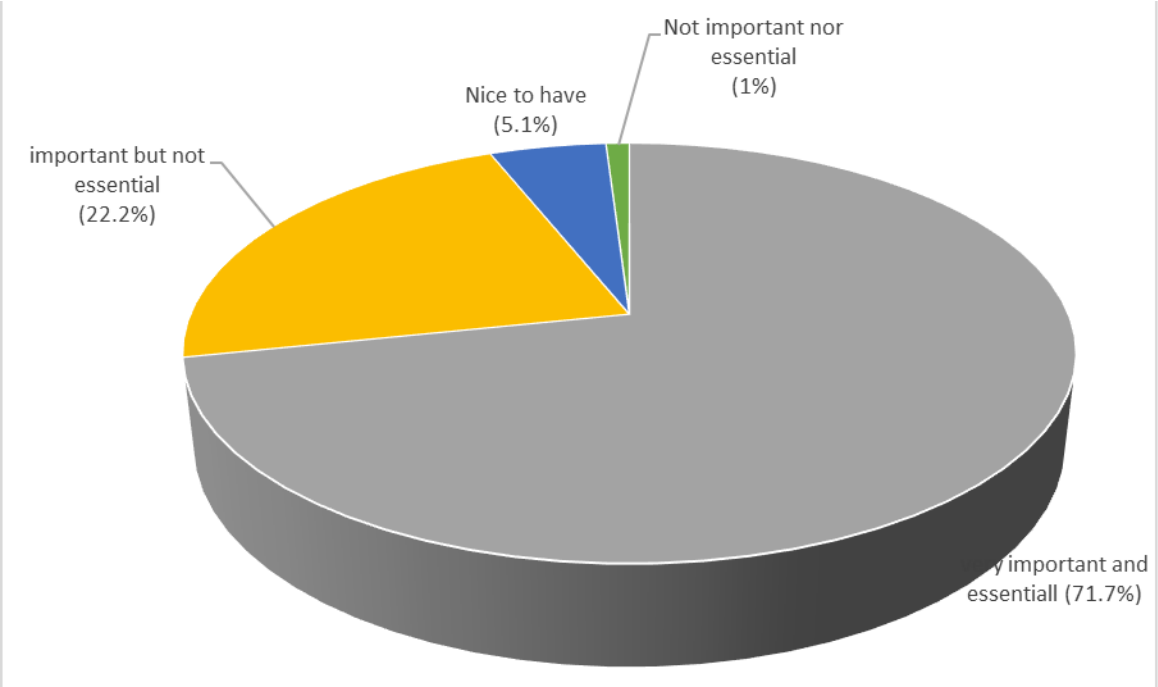

Figure 6.15: Respondents' opinions on the importance of information on family support in a product that is intended to enable DSM by adults in Kenya (n=99)

The majority (n=71, 71.7%) of the respondents indicated that it was very important and essential to include information in the product on how the family can support DSM. In contrast, a couple (n=22, 22.2%) indicated that it was important but not essential to include this information in the product. In view of these findings, including information on

how the family of the patient with diabetes can support DSM in the product reinforces DR 3, which has already been formulated, as follows.

DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

iii) Importance of information on support from health care providers in a product that is intended to enable DSM in Kenya

Respondents were asked to indicate the importance of information on a) reducing overreliance on health care providers, b) interaction between patients diagnosed with diabetes and health care providers, c) ways to access emergency care and d) support services provided by health care providers. Figure 6.16 gives a summary of the findings.

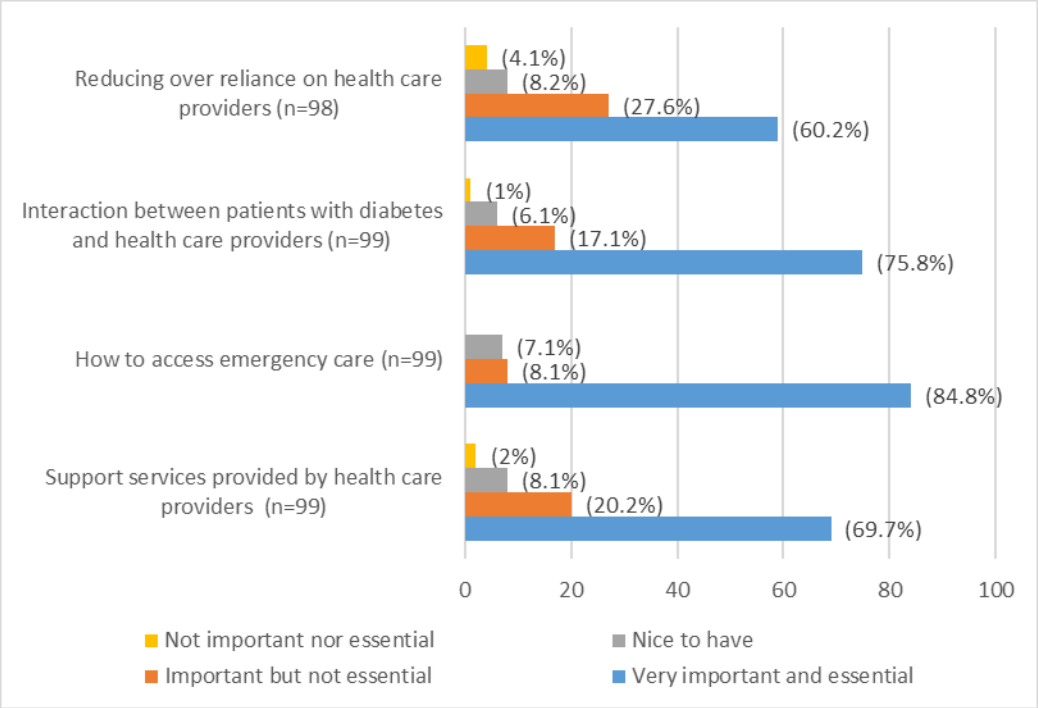

Figure 6.16: Respondents' opinions on the importance of information on support from health care providers in a product that is intended to enable DSM

In general, respondents indicated that it was very important and essential to include information on support from health care providers in a product that will enable DSM by adults in Kenya. The majority (n=59, 60.2%) of the respondents were of the opinion that information on reducing overreliance on health care providers was very important and essential in a product that is intended to enable DSM. Approximately three quarters (n=75, 75.8%) of the respondents claimed that information on relationships between patients with diabetes and health care providers would be very important and even essential in such a product. This finding partly supports DR 4, which has already been formulated, and which is given below.

DR 4: A product that will enable diabetes self-management among adults in Kenya should be sensitive and responsive to challenges such as shortage of health care staff and lack of self-care resources in this context.

Additionally, this data enhances PDR 1 (Chapter 4), which was not supported by data reported in Chapter 5. PDR 1 is converted to DR 15, and is stated below.

PDR 1: A product that will enable diabetes self-management by adults in the Kenyan context should primarily be used by patients diagnosed with diabetes.

DR 15: A product that will enable diabetes self-management by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes.

Further, a large proportion (n=84, 84.8%) of the respondents indicated that it was very important and essential to include information on how to access emergency services in a product that is intended to enable DSM by adults in Kenya. Finally, 69 (69.7%) of the respondents indicated it is very important and essential to include information on support services provided by health care providers in a product that is intended to enable DSM by adults in Kenya. This data supports DR 3, which reads as follows:

DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

iv) Importance of information on self-care resources in a product that is intended to enable DSM by adults in Kenya

Specific enquiry was made into the importance of including information on how to use glucometers and strips, how to use insulin syringes, how to store insulin, and the most effective ways of accessing self-care resources, Figure 6.17 summarises the findings of this enquiry.

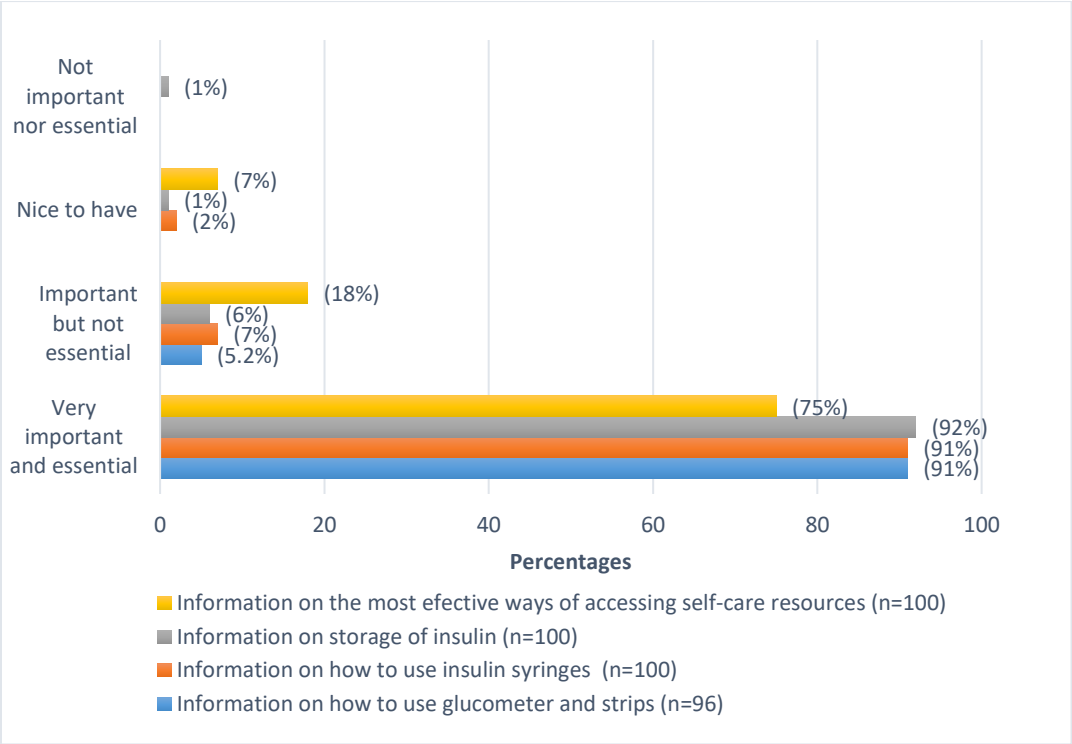

Figure 6.17: Respondents' opinion on the importance of information on self-care resources in a product that is intended to enable DSM in Kenya

A large proportion (n=91, 91%) of the respondents were of the opinion that it is very important and essential to include information on how to use a glucometer and strips. Similarly, 91 (91%) of the respondents indicated it was very important and essential to

include information in the product on how to use insulin syringes. A large proportion (n=92, 92%) of respondents also indicated that it would be very important to include information in a product that is intended to enable adults in Kenya who practice DSM to store insulin. A large group (n=75, 75%) also indicated that it was very important and essential for the product to contain information on cost-effective ways of accessing self-care resources. An overview of these findings is displayed in Figure 6.17. Only one respondent (1%) expressed that information on self-care resources was neither important nor crucial. Information on self-care resources strengthens DR 12, which is stated below, further.

DR 12: A product that will enable diabetes self-management among adults in Kenya should be responsive to patients' concerns on self-care resources in this context.

v) Importance of information on treatment modalities in a product that intended to enable DSM in Kenya

This section enquired about the importance of information on two aspects that relate to treatment modalities, namely information on a) the participatory role of patients with diabetes in treatment planning, and b) complications that can arise from non-compliance to DSM practices. Figure 6.18 illustrates the responses to the questions in this section.

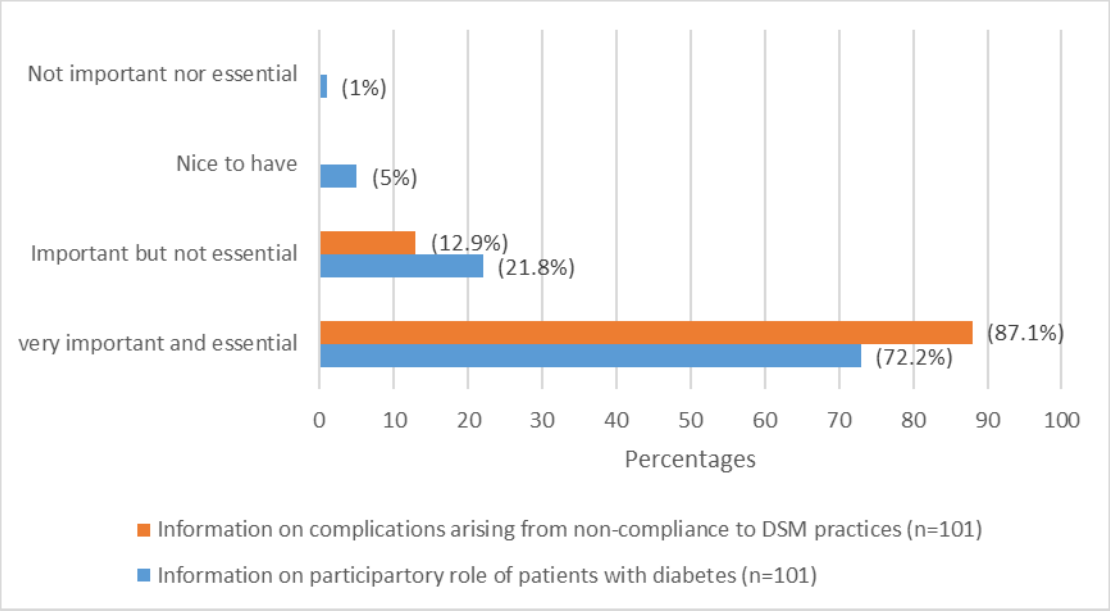

Figure 6.18: Respondents' opinions on the importance of information on treatment modalities in a product that is intended to enable DSM (n=101)

The majority (n=73, 72.2%) of the respondents were of the opinion that information on the participatory role of patients with diabetes in treatment planning is very important and essential. A similar view was expressed concerning information on complications that arise from non-compliance to DSM practices. The majority (n=88, 87.1%) of the respondents indicated that it was very important and essential to include information in the DSM product on complications that arise from non-compliance to DSM practices. This data supports DR 6 and DR 10, which are given below.

DR 6: A product that will enable diabetes self-management among adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities.

DR 10: A product that will enable diabetes self-management among adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management.

In conclusion, the general view of the respondents is evidently that most of the information that was presented in the survey was very important and essential. Therefore, the researcher will consider including this information in a prototype of the product that is intended to enable DSM. This prototype design will be presented in the next chapter, Chapter 7.

6.5 THE FORMAT OF A PRODUCT THAT IS INTENDED TO ENABLE DSM BY ADULTS IN KENYA

This section contains two questions. The first question asked respondents to give their views, in detail, on the format of a product that is intended to enable DSM in Kenya. The second question enquired about the most effective format for a product that is intended to enable DSM in Kenya. Results for this section will be presented in this order.

6.5.1 Details of the format of a product that will enable DSM in Kenya

In this section of the survey, respondents were asked to give their views on a set of 10 format details, as listed in Figure 6.19.

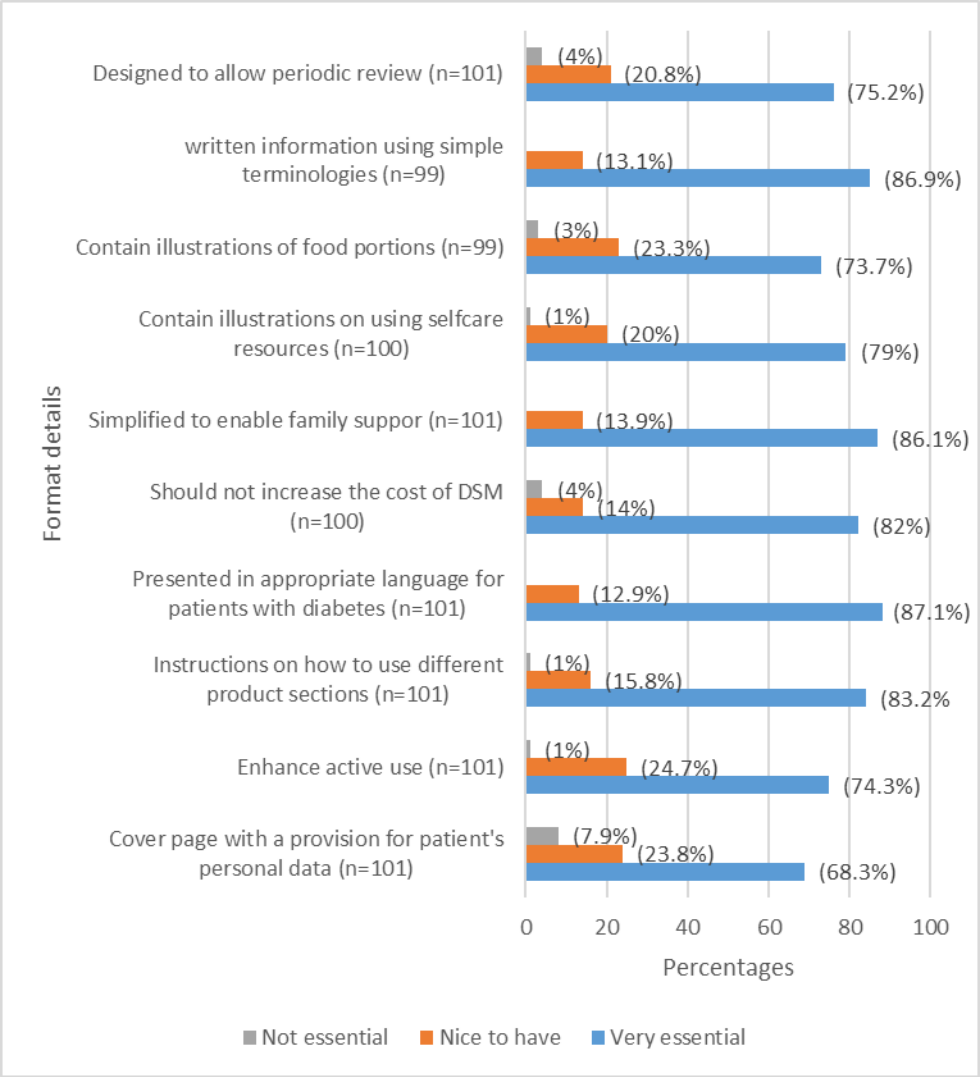

Figure 6.19: Respondents' views on the format details of a product intended to enable DSM

This analysis reveals that all the elements of the format of a product that will enable DSM in Kenya, as listed in Figure 6.19, were generally reported to be very essential. On average, a minority (n=2, 2%) of the respondents indicated that the details were not necessary. Table 6.3 provides a summary of format details and their corresponding DRs, which have already been formulated.

Table 6.3: Summary of format details and their corresponding DRs that have already been formulated

Details of the DSM product	Corresponding/existing DRs
The product should be designed to allow periodic review of the product	DR 13: A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and the patient's confidence in DSM
The product should contain illustrations on using self-care resources	DR 12: A product that will enable DSM by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.
The product should contain illustrations of food portions	DR 7: A product that will enable DSM by adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations.
The product should be simplified to enable family support	DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input
The product should not increase the cost of DSM	DR 1: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management

However, the details that are presented in Table 6.4 are not encapsulated in the DRs that have already been formulated: Therefore, additional DRs were formulated, as listed in Table 6.4.

Table 6.4: Formulation of additional DRs associated with details of a product that is intended to enable DSM

Details of the DSM product	Corresponding/existing DRs
The product should be designed to allow periodic review of the product	DR 13: A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and the patient's confidence in DSM
The product should contain illustrations on using self-care resources	DR 12: A product that will enable DSM by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.
The product should contain illustrations of food portions	DR 7: A product that will enable DSM by adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations.
The product should be simplified to enable family support	DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input
The product should not increase the cost of DSM	DR 1: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management

In addition, the majority (n=74, 74.3%) (*cf.* Figure 6.19) of the respondents indicated that the product should be designed to enhance active use by patients diagnosed with diabetes. This finding will be considered in the next section (6.5.2), which will cover the most effective format for a product that is intended to enable DSM by adults in Kenya, to reinforce PDR 1.

6.5.2 Most effective format for a product that is intended to enable DSM in Kenya

In this section of the survey, respondents were asked to provide their opinions on the most effective format for a product that will enable DSM in Kenya. The formats that were captured in the survey were charts, pamphlets, videos/video clips, mobile phone applications, workbook, manual, and oral transfer of knowledge. The findings on the most effective format for a product that will enable DSM are all linked to DR 15, which will be

presented at the end this section. Consequently, a different DR was not drawn up for each of the following sections, instead, a combined DR was formulated, to serve as one format design that encapsulated all the format requirements of the product.

6.5.2.1 Charts

An analysis of the responses on the effectiveness of charts for enabling DSM is presented in Figure 6.20.

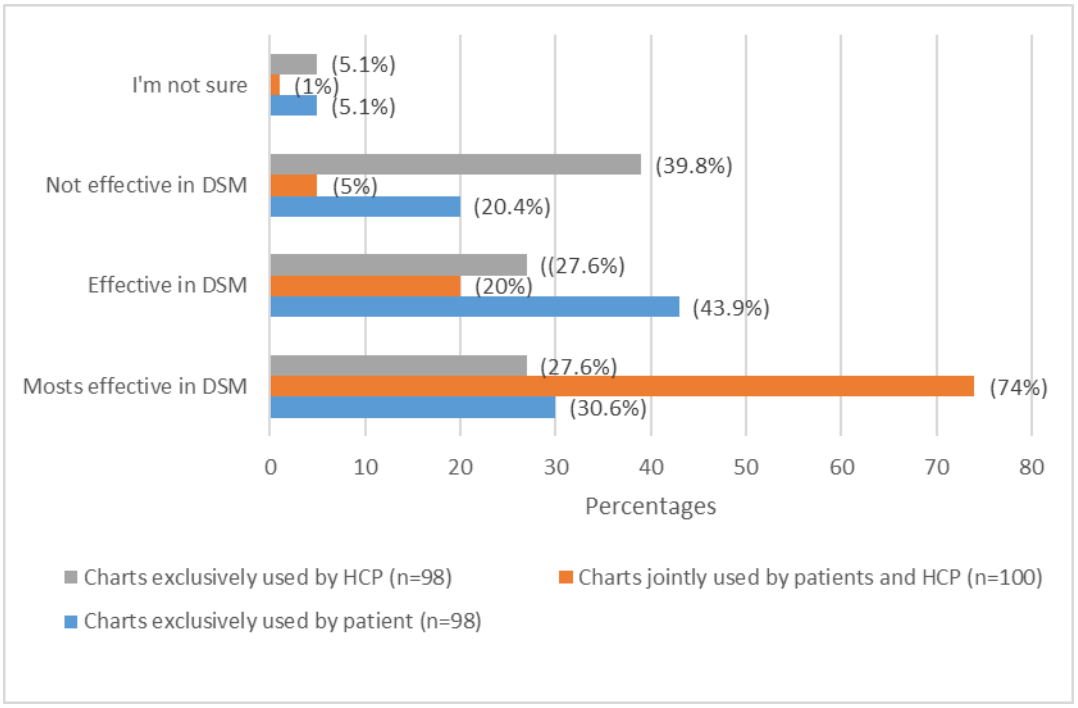

Figure 6.20: Respondents' views on the effectiveness of charts in enabling DSM

According to the majority (n=74, 74%) of respondents, charts that are used jointly by patients diagnosed with diabetes and health care providers would be the most effective. Close to half (n=43, 43.8%) the respondents were of the opinion that charts used exclusively by patients with diabetes would be effective. A significant proportion (n=39, 39.7%) indicated that charts used exclusively by health care providers would not be effective.

6.5.2.2 Pamphlets

Respondents' views on the effectiveness of pamphlets in DSM are summarised in Figure 6.21.

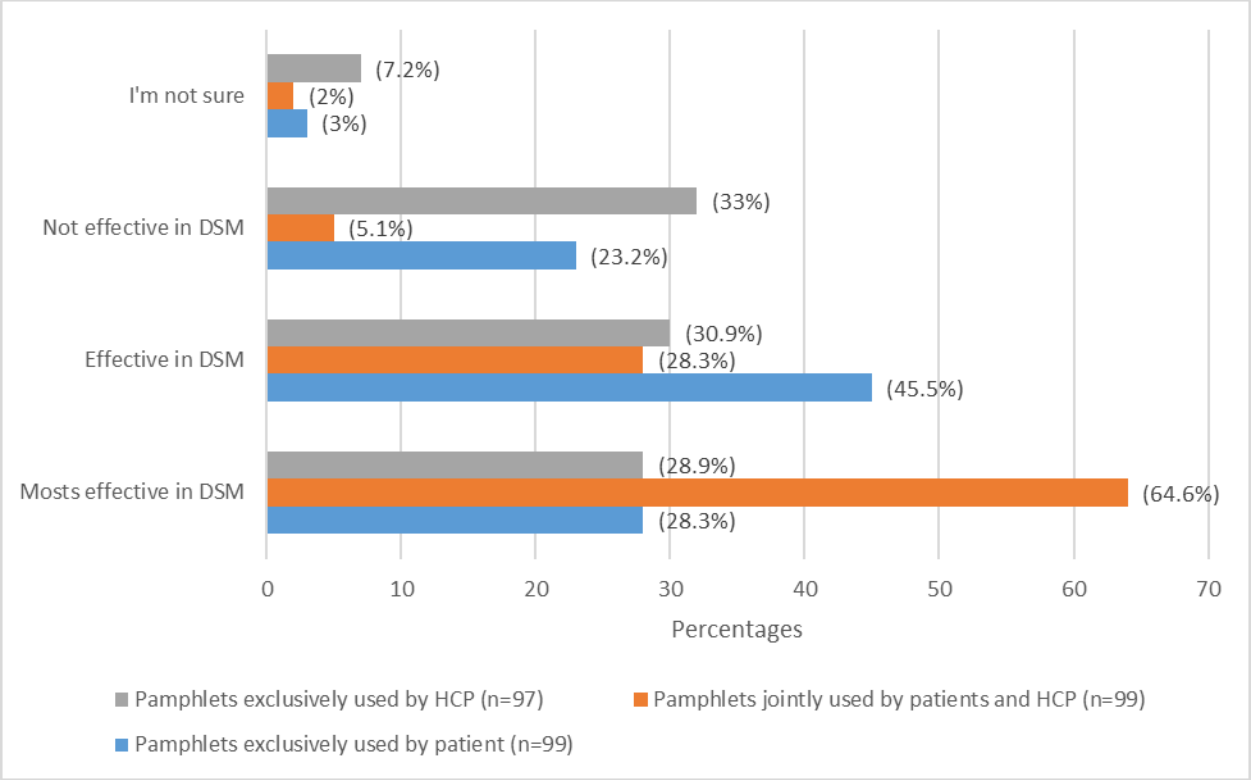

Figure 6.21: Respondents' views on the effectiveness of using pamphlets to encourage DSM by adults in Kenya

As shown in Figure 6.21, the majority (n=64, 64.6%) of the respondents indicated that pamphlets used jointly by patients diagnosed with diabetes and health care providers would be the most effective. Slightly less than half (n=45, 45.5%) the respondents were of the view that pamphlets used exclusively by patients diagnosed with diabetes would be effective. Approximately a third (n=32, 33%) of the respondents were of the opinion that pamphlets exclusively used by health care providers would not be effective.

6.5.2.3 Videos/video clips

The respondents' opinion on the effectiveness of videos/video clips are presented in Figure 6.22.

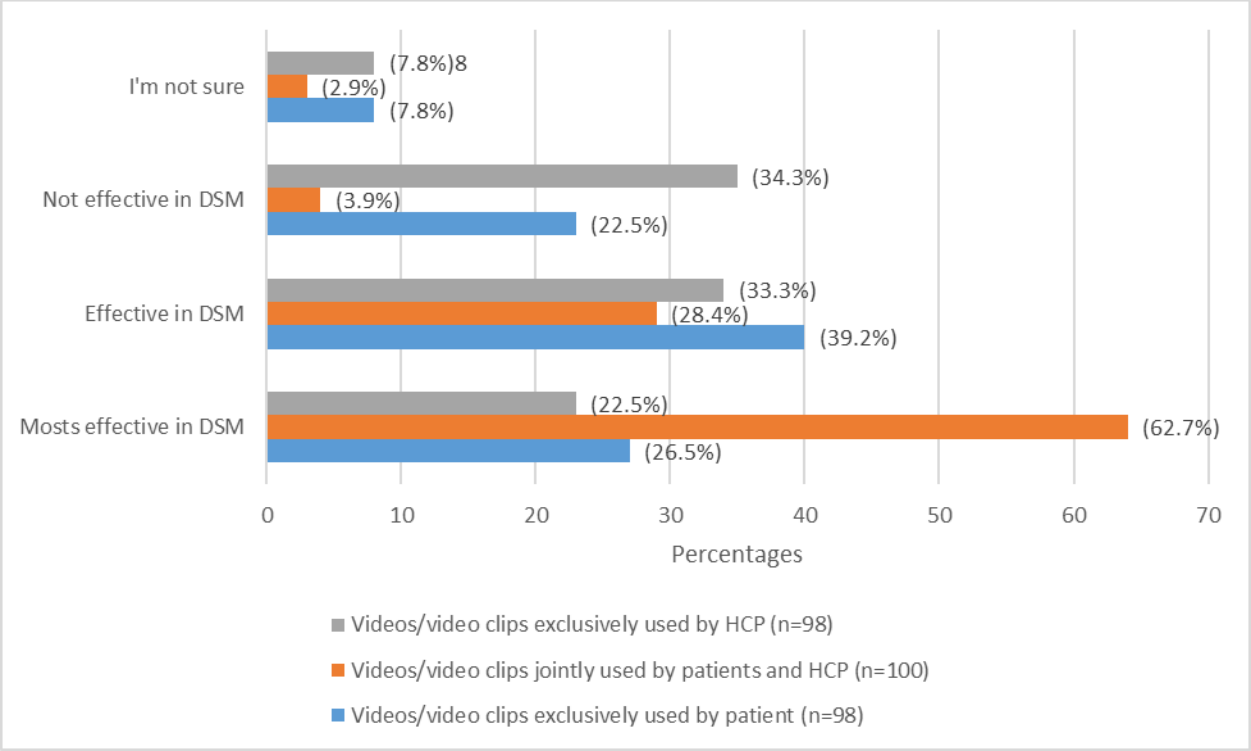

Figure 6.22: Respondents' views on the effectiveness of videos/video clips in DSM

Videos/video clips jointly used by patients diagnosed with diabetes and health care providers were reported to be the most effective by the majority (n=64, 62.7%) of the respondents. Less than half (n=40, 39.2%) the respondents indicated that videos/video clips exclusively used by patients with diabetes were effective. Respondents indicated that videos/video clips used exclusively by health care providers were unlikely to be effective in DSM (n=35, 34.3%).

6.5.2.4 Mobile phone applications

The respondents' opinions on the effectiveness of using mobile phone applications for DSM are summarised in Figure 6.23.

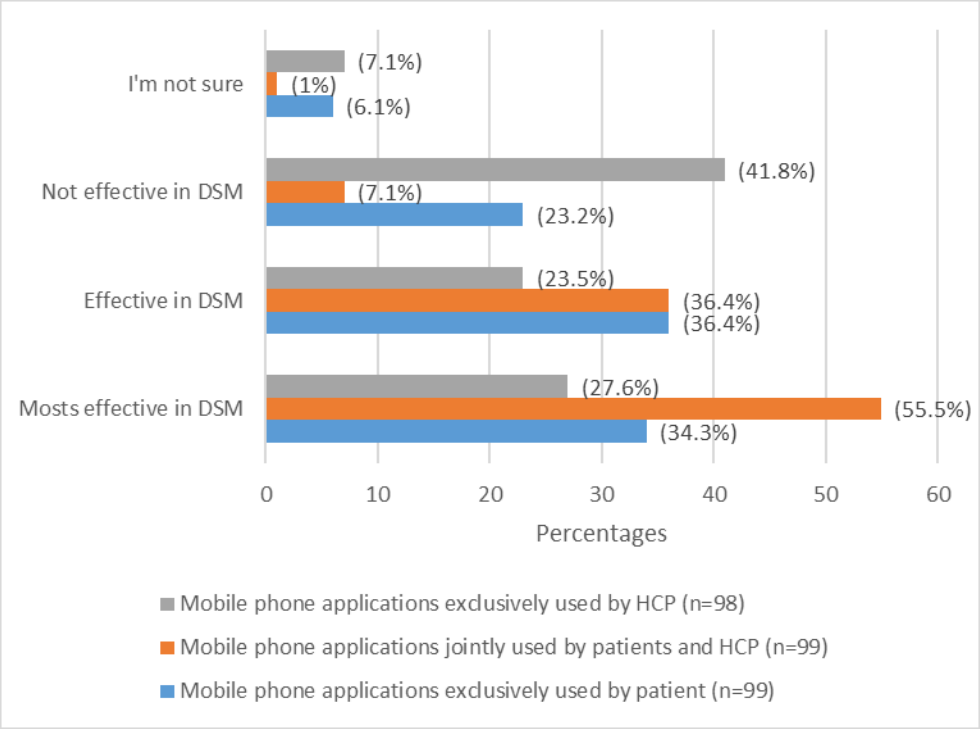

Figure 6.23: Respondents' opinion on the effectiveness of using mobile phone applications to encourage DSM by adults in Kenya

More than half (n=55, 55.5%) the respondents were of the opinion that mobile phone applications used jointly by patients diagnosed with diabetes and health care providers would be the most effective way to encourage DSM. Approximately a third (n=36, 36.4%) of the respondents indicated that, if mobile phone applications were used exclusively by patients with diabetes, they could be effective. A similar proportion (n=36, 36.4%) of the respondents indicated that, if mobile phone applications were used jointly by patients diagnosed with diabetes and health care providers, they would be effective. If mobile phones were used exclusively by health care providers, it would not be effective, as indicated by a significant proportion (n=41, 41.8%) of the respondents.

6.5.2.5 Workbook

Respondents' opinions on the effectiveness of workbooks to enable DSM are illustrated in Figure 6.24.

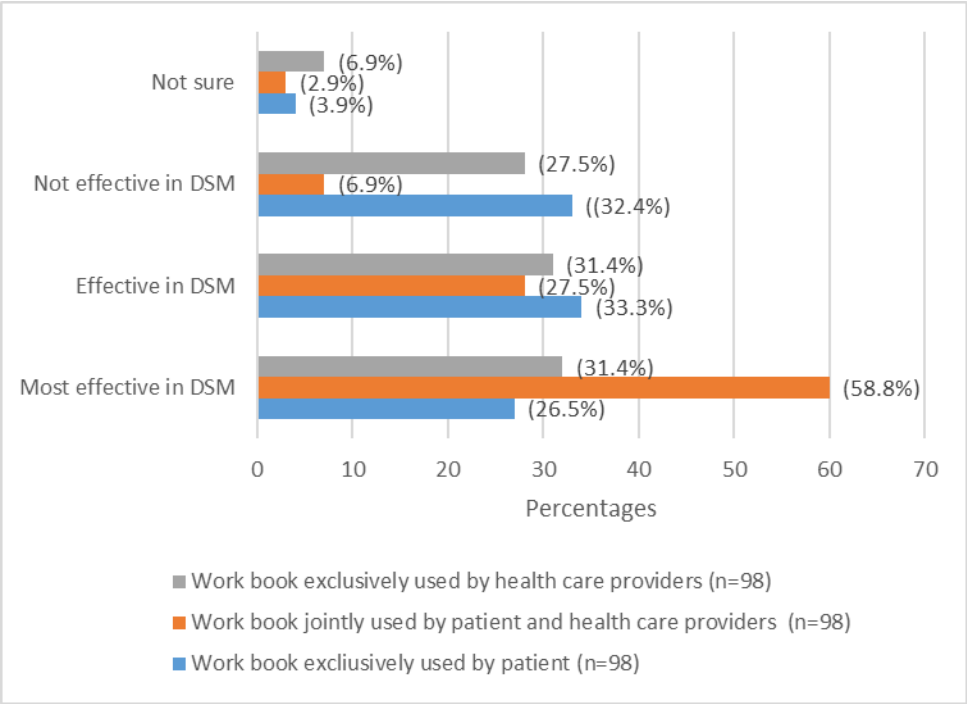

Figure 6.24: Respondents' opinions on the effectiveness of using workbooks to encourage DSM by adults in Kenya (n=98)

The most effective format for a workbook, according to the majority (n=60, 61.2%) of the respondents, is a workbook used jointly by patients with diabetes and health care providers. Approximately a third (n=34, 34.7%) of the respondents indicated that a workbook exclusively used by the patient was effective. The format that was reported by a third (n=33, 33.7%) of the respondents as not being effective was a workbook used exclusively by the patients with diabetes, followed by (n=28, 28.6%) workbook used exclusively by health care providers.

6.5.2.6 Manual

Details of the analysis of data on the effectiveness of manuals for encouraging DSM are illustrated in Figure 6.25.

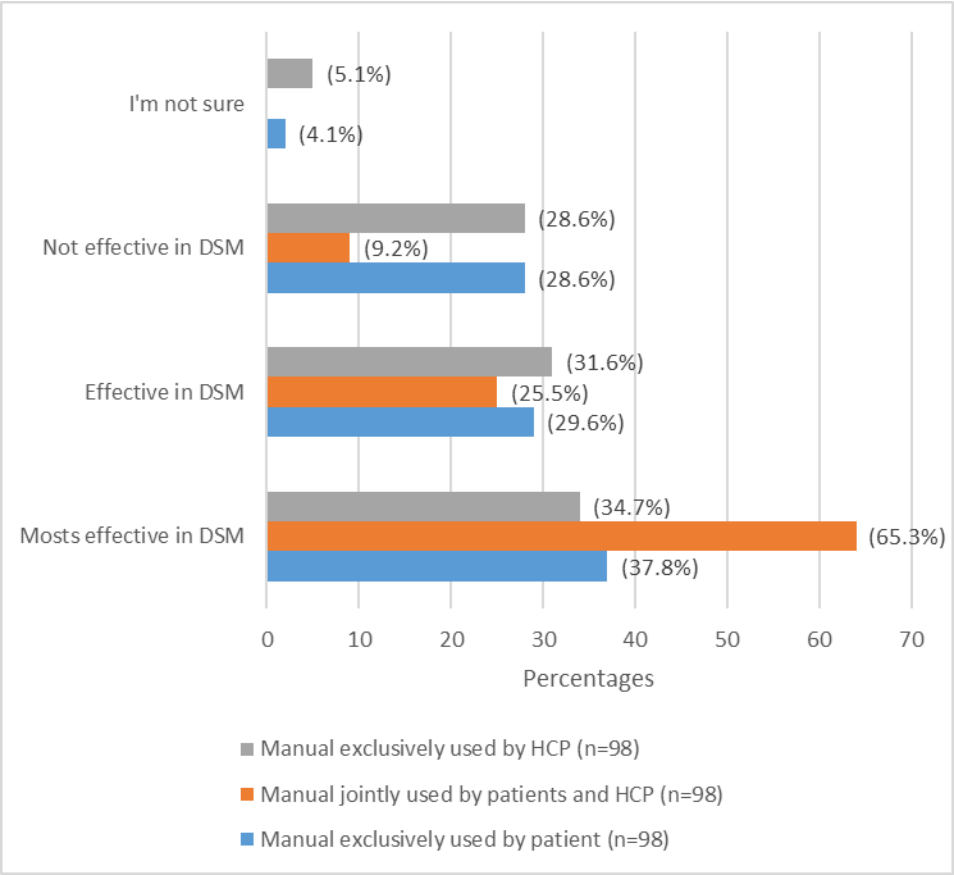

Figure 6.25: Respondents' views on the effectiveness of using a manual to encourage DSM by adults in Kenya

As illustrated in Figure 6.25, the majority (n=64, 65.3%) of the respondents were of the opinion that manuals used jointly by patients with diabetes and health care providers would be the most effective way to do DSM. Approximately a quarter (n=28, 28.6%) of the respondents indicated that manuals used exclusively by patients with diabetes, and manuals used exclusively by health care providers, would not be effective.

6.5.2.7 Oral transfer of knowledge

Respondents' views on the effectiveness of transferring knowledge orally to encourage DM are summarised in Figure 6.26.

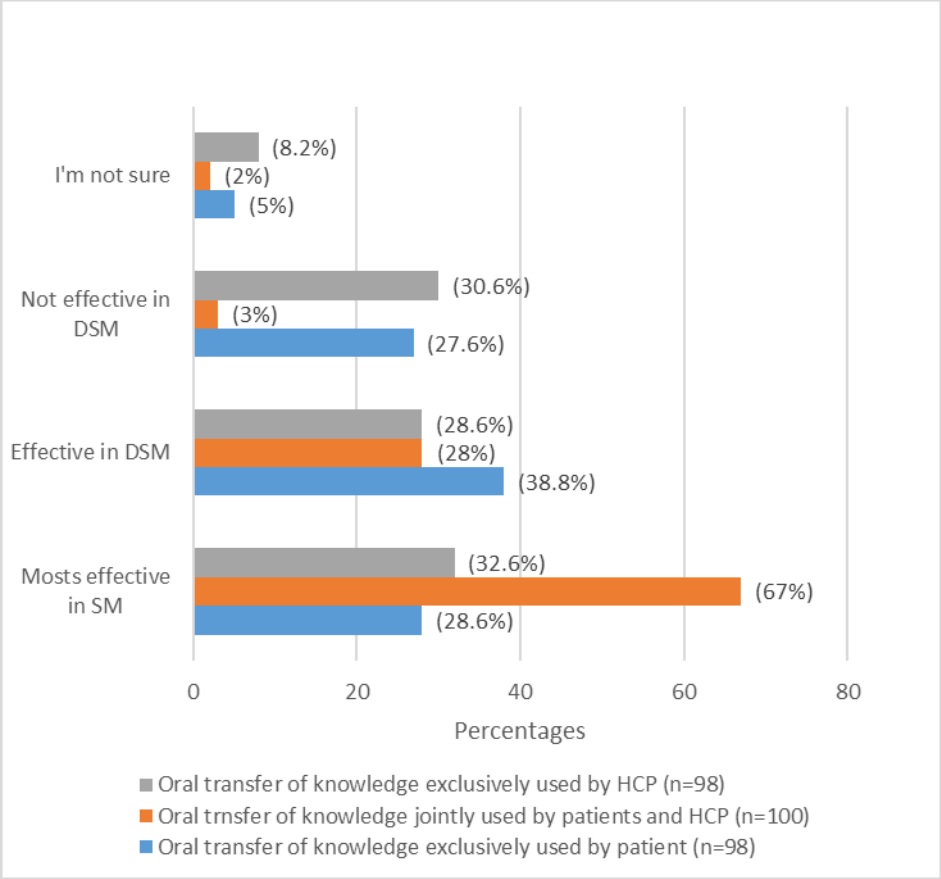

Figure 6.26: Respondents' views on the effectiveness of the oral transfer of knowledge to encourage DSM by adults in Kenya

The majority (n=67, 67%) of the respondents were of the opinion that transferring knowledge orally would be most effective when used jointly by patients diagnosed with diabetes and health care providers. Slightly less than a third (n=30, 30.6%) of the respondents indicated that orally transferring knowledge would not be effective when it was done exclusively by health care providers.

In summary, the findings clearly demonstrate that respondents believed that the most effective format of a product to encourage DSM by adults in Kenya would be one that it can be used jointly by health care providers and patients with diabetes. This opinion encapsulates a previous finding that emerged from question 6.5.1, to which the majority (n=75, 74.5%) of the respondents responded that it is essential for the product to encourage its active use by patients with diabetes. For this reason, DR 15 is strengthened further. The product will, therefore, be used in a joint effort between health care workers and patients diagnosed with diabetes.

DR 15: A product that will enable diabetes self-management by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes.

The survey respondents did not consider any of the formats presented as being unsuitable. Therefore, the researcher considered using any of these formats that emerged – whichever emerged as the most suitable for presenting the product. The formats that were considered are charts, pamphlets, videos/video clips, mobile phone applications, a workbook, a manual and the oral transfer of knowledge. The researcher selected one format and, if considered necessary, complemented the main format by other relevant formats. DR 16 was extracted to support this view.

DR 16: A product that will enable diabetes self-management by adults in Kenya should be designed in the format that the author perceives as the most appropriate, while allowing room for presentation of some sections in subsidiary format(s) as it deems necessary.

The last section of this survey was aimed at identifying the mode of use of the DSM product.

6.6 MODE OF USE OF A PRODUCT THAT IS INTENDED TO ENABLE DSM BY ADULTS IN KENYA

This section of the survey focused on the mode of use of a product that would be likely to enable DSM in Kenya. Respondents were asked to indicate how strongly they agreed with statements on the mode of use of the product. The findings are illustrated in Figure 6.27.

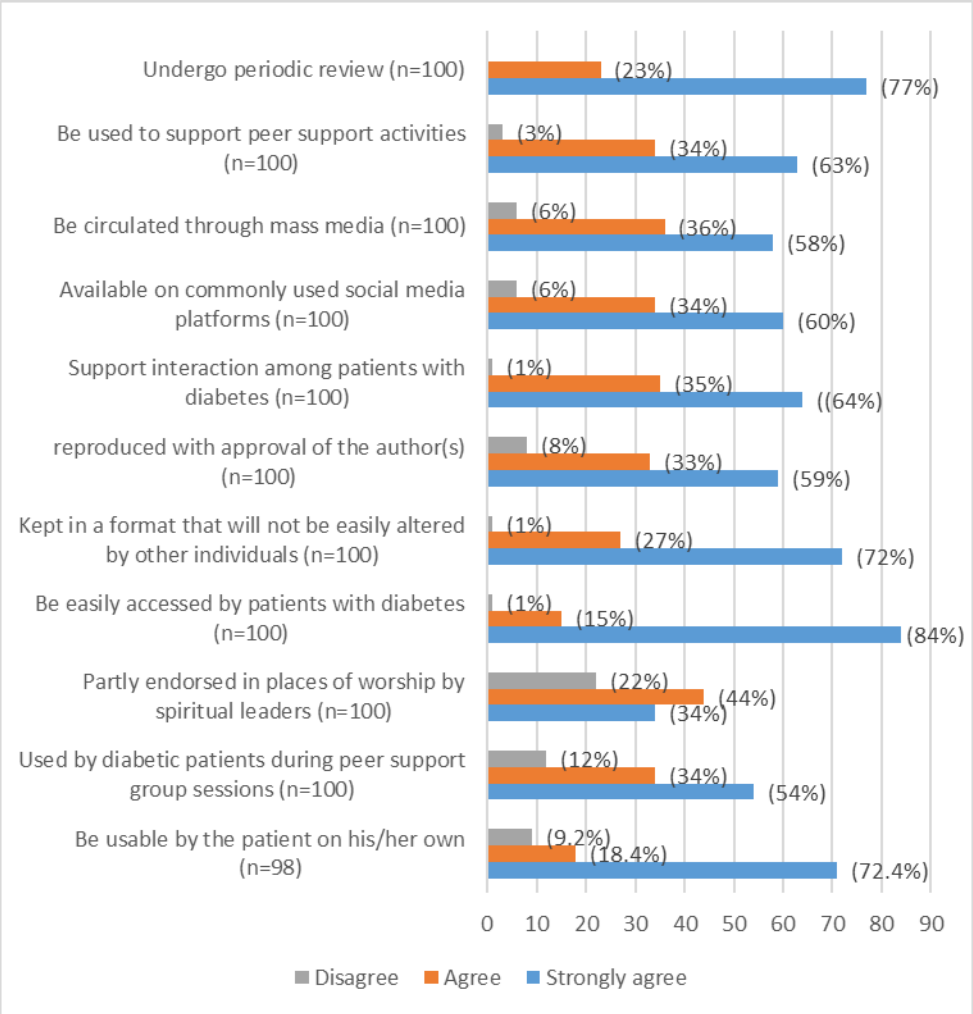

Figure 6.27: Respondents' views on the mode of use of a product that is intended to enable DSM by adults in Kenya

As illustrated in Figure 6.27, respondents generally agreed strongly with the statements presented on the mode of use of a product that is intended to enable DSM in Kenya. Table 6.4 summarises the statements presented, the proportions of respondents who agreed strongly with the statements, and the alignment of the statements with existing DRs.

Table 6.5: Statements on the mode of use of the product, proportions of respondents who strongly agreed with the statements and alignment of the statements with DRs

Statements on the mode of use of a product that will enable DSM by adults in Kenya	Respondents who agreed strongly (n, %)	Corresponding DRs that have been formulated
The product could undergo periodic review	(n=77, 77%)	DR 13: A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and the patient's confidence in DSM
The product could be used to support peer support activities	(n=63, 63%)	DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input
The product should support interactions among patients diagnosed with diabetes	(n=64, 64%)	
The product will only be reproduced with the approval of the author(s)	(n=59, 59%)	DR 17: A product that will enable diabetes self-management by adults in Kenya should contain instructions on how to use different sections of the product and how to reproduce the product, and have a cover page that provides a patient's personal details
The product should be kept in a format that will not be easily altered by users or any other individuals	(n=72, 72%)	
The product should be used during peer support group sessions by patients who are diagnosed with diabetes	(n=54, 54%)	DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers' input
Patients diagnosed with diabetes should be able to use the product on their own.	(n=71, 72.4%)	DR 4: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context

Three of the statements on the mode of use of the product that respondents strongly agreed with were not covered by DRs that had already been formulated. Table 6.5 presents a summary of these statements, the proportions of respondents who strongly agreed with the statements, and the additional DR that was extracted. A previous section of this chapter (*cf.* 6.4.1.6) reported on respondents' opinions that both social and mass media had a moderate influence on DSM. In contrast, in this section, the majority (n=58, 58%) were of the view that the product should be circulated via mass media. Another significant proportion (n=60, 60%) agreed strongly that the product should be circulated through commonly used social media platforms. These findings, therefore, support an additional and final DR, DR 19, as indicated in Table 6.5.

Table 6.6: Summary of statements on the mode of use of the product, proportions of respondents that strongly agreed with the statements and alignment of the statements with DR 19

Statements on the mode of use of a product that will enable DSM by adults in Kenya	Respondents who agreed strongly (n, %)	Additional DR
The product could be circulated through mass media	(n=58, 58%)	DR 19: A product that will enable diabetes self-management by adults in Kenya should be circulated through easily accessible channels, including most commonly used social media platforms and mass media
The product could be made available on commonly used social media platforms	(n=60, 60%)	
The product should be easily accessible to patients diagnosed with diabetes	(n=84, 84%)	

However, less than half (n=34, 34%) the respondents strongly agreed with the statement that the DSM product should be endorsed by places of worship by spiritual leaders, in contrast to 44 (44%) of the respondents who believed that the product should be endorsed by places of worship.

The researcher will, therefore, uphold all the presented statements on the mode of use of the product, as they are encapsulated in the corresponding DRs, except for the statement on endorsement by places of worship. The researcher had also asked the respondents to provide any other suggestions on the mode of use of the product, but none of the respondents provided additional information.

6.7 FINAL LIST OF DRs FOR A PRODUCT THAT WILL ENABLE DSM AMONG ADULTS DIAGNOSED WITH DIABETES IN KENYA

The following is a final composite of 19 DRs that were taken forward to Chapter 7. DR 2 was not supported by data from the surveys. It was extracted from Chapter 5's Kawa discussions (*cf.* 5.4.1).

DR 1: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management.

DR 2: A product that will enable diabetes self-management by adults in Kenya should address challenges associated with food choices, food availability and food security in a practicable and executable manner'

DR 3: A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

DR 4: A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context.

DR 5: A product that will enable diabetes self-management by adults in Kenya should seek to facilitate early identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.

DR 6: A product that will enable diabetes self-management by adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities.

DR 7: A product that will enable diabetes self-management by adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations

DR 8: A product that will enable diabetes self-management by adults in Kenya should be responsive to physical state/systemic illness, family history of diabetes, socio-economic status, education and age of people diagnosed with diabetes.

DR 9: A product that will enable DSM by adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM

DR 10: A product that will enable diabetes self-management by adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management.

DR 11: A product that will enable diabetes self-management by adults in Kenya should be responsive to treatment options in this context.

DR 12: A product that will enable diabetes self-management by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.

DR 13: A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and confidence in DSM.

DR 14: A product that will enable DSM by adults in Kenya should contain information on diabetes-related mental illness and or other comorbidities.

DR 15: A product that will enable DSM by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes.

DR 16: A product that will enable diabetes self-management for adults in Kenya should be written using simple terminologies in a language that is appropriate and acceptable to patients with diabetes.

DR 17: A product that will enable diabetes self-management by adults in Kenya should contain instructions on how to use different sections of the product, how to reproduce the product and a cover page with provision of patient's personal details.

DR 18: A product that will enable diabetes self-management by adults in Kenya should be designed in a format that the author perceives as most appropriate while allowing room for presentation of some sections in subsidiary formats as it deems necessary.

DR 19: A product that will enable diabetes self-management by adults in Kenya should be circulated through easily accessible channels, including most commonly used social media platforms and mass media.

6.8 SUMMARY

In summary, this chapter presented data elicited by the survey, which was analysed using descriptive methods, such as frequencies and percentages. These findings were presented in the form of tables and figures, such as pie charts and bar graphs. The general structure of the research questionnaire was presented. A detailed description of respondents' demographic factors was also presented. Findings on the content, the format and mode of use of a product that is intended to enable DSM were presented in this chapter. DRs derived from Chapter 5, together with those derived from the data reported in Chapter 6, were presented systematically; the respective sections were supported by data provided by the respondents. The survey findings support some of the PDRs that had been developed in Chapter 4, and which had not been supported by data from the Kawa group discussions. The PDRs were, therefore, extrapolated into final DRs. In total, 19 DRs were finalised in this chapter. These final list of DRs will be taken forward to Chapter 7, the next chapter of this study.

CHAPTER 7
FINDINGS OF THE EXPERT REVIEWS

7.1 INTRODUCTION

This chapter will present and discuss the findings of expert reviews. The expert reviews were conducted by four diabetes experts who were asked to evaluate the DSM prototype guide against the evaluation criteria that had been set. The findings in this chapter will follow the order of the evaluation criteria form. It will start with a brief explanation of the structure of the DSM guide evaluation form that was presented to diabetes experts. In the next section of this chapter, reviewers' demographic data, which includes the country where they practice, their work stations and duration of experience of the provision of care to people diagnosed with diabetes, will be presented. Then, the findings relating to the major sections of the evaluation criteria will be presented. These sections are, a) The extent to which the 19 requirements were met, b) The extent to which the adapted evaluation criteria of Prat *et al.* (2015) were met, and c) The experts' general impression of the procedure of use, content, and general layout of the prototype DSM guide. In each of these sections, the researcher will discuss the experts' views in relation to whether they believed the criteria were fully or partially met, or not met at all. Additionally, the researcher considered all comments expressed by the experts in the discussion of the findings. The researcher's verdict on whether the experts' views would be incorporated in the design of the final DSM guide, or not considered, was informed by the contextual relevance of the opinions, as well as alignment with literature. Therefore, the final DSM guide was designed in consideration of the experts' inputs, which will be discussed in this chapter. The chapter will end with a brief conclusion.

7.2 STRUCTURE OF THE DSM GUIDE EVALUATION FORM

The expert reviews were guided by the DSM guide evaluation form that had been designed by the researcher. This evaluation form was informed by the list of 19 DRs that had been derived from the first two phases of this study, as well as the evaluation criteria of Prat *et al.* (2015). The first section of the DSM guide evaluation form contained three

questions relating to the diabetes experts' demographic details. The rest of the evaluation form was divided into three sections, namely Section A: DRs, Section B: Evaluation criteria, and Section C: General evaluation of the DSM guide (*cf.* Addendum 7).

In Section A, DRs, the diabetes experts were asked to indicate their opinions on the extent to which the 19 DRs were achieved in the prototype DSM guide. The experts were asked to familiarise themselves with the prototype DSM guide (*cf.* Addendum 7) that was provided to them, before filling in the evaluation form. The experts were provided with additional space for their inputs if they believed particular DRs met the requirement either partially or not at all.

In Section B, Evaluation criteria, the evaluation criteria of Prat *et al.* (2015) were adapted and tailor-made to serve as the evaluation criteria for the prototype DSM guide. The experts were required to give their views on the characteristics of a product as provided in the framework of Prat *et al.*, namely goal, environment, structure, activity and evolution; they gave their opinions on whether the criteria were full or partially met, or not met at all. Extra space was provided for the experts to provide additional input on how the different characteristics of the prototype product could be improved.

In the last section, Section C, General evaluation of the DSM guide, sufficient space was provided for the diabetes experts to indicate their general impression of the procedure of use, content and the layout of the prototype DSM guide.

7.3 REVIEWERS' DEMOGRAPHIC DATA

In this section, I will present the findings of experts' demographic data, including the countries where they practiced, their workstations and duration of experience in the provision of care to people diagnosed with diabetes.

7.3.1 Country where the reviewers were practicing

Three out of the four diabetes experts who participated in this study reported that they were practicing in Kenya, while the remaining expert practiced in Uganda, a neighbouring country to Kenya, and with a similar health system to that in force in Kenya.

7.3.2 Reviewers' workstations

Two of the diabetes experts indicated that they worked for the Ministry of Health. Another one was a diabetes expert at an outpatient diabetes clinic in a hospital setup, while one indicated that they worked for a non-governmental organisation.

7.3.3 Duration of experience

Concerning the duration of experience, two of the diabetes experts indicated that they had provided care to people diagnosed with diabetes for periods ranging from 6 to 10 years. One of the experts indicated that their experience was between 1 to 5 years, while the last expert had experience of more than 10 years.

7.4 REVIEWERS' OPINIONS ON THE EXTENT TO WHICH THE PROTOTYPE DIABETES SELF-MANAGEMENT GUIDE MET THE SET EVALUATION CRITERIA

In this section, the reviewers' opinions on the extent to which the 19 requirements and the evaluation criteria were met, will be presented.

7.4.1 Reviewers' opinions on the extent to which requirements were met

In this section, the reviewers' opinions on the extent to which the 19 DRs were met will be presented, as part of the evaluation criteria for the DSM guide. Varied responses were provided by the diabetes reviewers. The opinions of the reviewers on the extent to which the 19 DRs were achieved represent three categories. These categories are: a) Requirements that were unanimously reported as being fully met, b) Requirements that were partially met, and c) Requirements that elicited various responses (Fully met/Partially met/Not met) from the experts. A summary of the reviewers' opinions is presented in Table 7.1.

Table 7.1: Reviewers' opinions on the extent to which requirements were met in the prototype DSM guide

Reviewers	Experts' opinions on the extent to which requirements 1 to 19 are achieved in the prototype DSM guide																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	F	P	F	P	F	F	N	F	F	F	F	F	F	F	F	F	F	F	F
2	P	P	P	P	P	P	P	N	P	P	P	P	P	P	F	F	P	0	F
3	F	F	F	F	F	F	F	F	F	F	P	F	F	F	P	F	F	F	F
4	F	P	F	F	P	N	P	P	P	F	F	F	P	P	F	F	F	P	F

Scale: F: Fully meets requirement; P: Partially meets requirement; N: Does not meet requirement

7.4.1.1 Reviewers' opinions on requirements that were fully met in the prototype DSM guide

Out of the 19 requirements, only two DRs, namely DRs 16 and 19 (*cf.* 6.7) were indicated by the experts to be fully met in the prototype DSM guide. As such, no amendments were made to the prototype with regard to terms used and mode of circulation, which is addressed by these two requirements.

7.4.1.2 Reviewers' opinions on requirements that were partially met in the prototype DSM guide

Reviewers indicated that some of the requirements were partially met. This is illustrated in Table 7.1, which shows how the individual experts responded. Each of the requirements that was indicated as partially met is presented, alongside the verdict of the researcher on whether the opinion is accepted or not accepted, as supported by contextual as well as literature-based rationale. The first requirement that was indicated as partially met is requirement 1.

A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management

Reviewer 2 was of the opinion that requirement 1 was partially met. The other three reviewers indicated that this requirement was fully met. Reviewer 2 added the following comment in their feedback on requirement 1: *The technical content needs to be reviewed by a team of experts*. A systematic review on the burden of non-communicable diseases in LMICs (Kazibwe, Tran and Annerstedt, 2021, p. 12) concluded that the cost of managing non-communicable diseases, including diabetes, is often not addressed. This finding may imply that the cost implications of managing diabetes is best determined by the person diagnosed with the condition. Considering this finding, it is the view of the researcher that technical experts may not be the best people to provide substantive input on how the DSM guide can be designed to be sensitive about the financial burden of DSM in Kenya. The researcher is also of the view that once people diagnosed with diabetes access and use the designed DSM guide (*cf.* Addendum 9), they can provide first-hand experience on whether the guide is sensitive about the financial burden of DSM, or not. Consequently, the researcher decided to uphold the prototype product in relation to requirement 1.

The next requirement that was reported to be partially met is requirement 2, which reads,

A product that will enable diabetes self-management by adults in Kenya should address challenges associated with food choices, food availability and food security in a practicable and executable manner

Three of the reviewers, reviewers 1, 2 and 4, indicated that requirement 2 was partially met. Reviewer 1 added the following comment: *Relook at the appropriateness of the 'roasting' picture in page 5*. Further enquiry for clarification by the expert revealed that the Kenyan population does not traditionally roast chicken, and, therefore this image could cause confusion to users. The researcher replaced the photo with a more familiar photo

(*cf.* Addendum 9). This change was made to ensure context-specific content in the DSM guide. Additionally, reviewer 2 gave the following comment in their response: *The technical content needs to be reviewed by a team of experts*. The researcher was not successful in attempts to elicit clarification from this reviewer, and was unable to incorporate feedback meaningfully and, therefore, dismissed these specific comments.

Reviewer 4 had several additional comments on requirement 2, with the first comment being, *A few of the recommendations regarding food may not be accurate such as avoiding fruits.* Fruits are a good source of fibre, vitamins, minerals, and antioxidants that can help maintain health and vitality amongst people living with diabetes. It is known that people diagnosed with diabetes should control their caloric intake. Upon further literature review, the researcher noted that some fruits – those that are classified as having moderate to high glycaemic index – should be eaten in moderation (Diabetes Canada, 2013, p. 3). Therefore, the section that initially referred to avoiding fruits such as grapes in the prototype DSM guide, was modified in the final DSM guide (*cf.* Addendum …..) to read, “take small portions of fruits that are known to quickly raise blood sugar, such as grapes, pineapples, ripe bananas, and watermelon”.

The second comment from reviewer 4 was, *Also, pilau and meat are acceptable to be consumed, focus rather on emphasizing the size of portions as portion control is where we fail the most*. Contextual facts about how a meal such as pilau is prepared indicate that it unsuitable to be eaten by people diagnosed with diabetes. This meal is made from white rice, and had a high fat content. It is recommended that people with diabetes should eat whole grains that are high in fibre (ADA, 2022, p. S63). In view of this recommendation, pilau does not meet the dietary recommendations for people with diabetes. Literature recommends people with diabetes need to take high protein diet (Evert *et al.*, 2019, p. 734). Although pilau has meat as one of the ingredients, the method of cooking this meal reduces its suitability. Concerning the experts’ comment on food portions, this information is already presented in the prototype DSM guide.

Reviewer 4 also commented that, *Sweetened juices and sweetened tea are very useful in cases where the patient may have episodes of hypoglycaemia. It would be great to not*

advise them to avoid them entirely as this may cause a hesitancy to treat hypoglycemia with sugary drinks which is very important. The literature recommends that people diagnosed with diabetes replace sweetened drinks with water, and not to routinely drink sweetened tea and juices (ADA, 2022, p. S63). Therefore, the researcher modified the wording, “avoid sweetened tea and sweetened juices”, to read, “replace sweetened tea and juices with water”. By doing so, people living with diabetes are expected limit routine ingestion of sweetened tea/juices, without shying away from these drinks in cases of hypoglycaemia. This modification accommodates reviewer 4’s concern about the use of sweetened drinks by people diagnosed with diabetes.

Another comment by reviewer 4 on requirement 2 was, *Specify the traditional eating habits that you are speaking of as traditional foods in Uganda tend to be the healthier options*. The traditional custom of eating from a common plate is already implied in the prototype DSM guide. The fact is that dietary habits vary between communities, and are determined by personal factors, such as psychological, socio-cultural, economic factors, (Monterrosa *et al.*, 2020, p. S61), and many other factors; therefore, the researcher indicated in the health care provider section the need to assist people diagnosed with diabetes to identify unsuitable eating habits in their communities. Lastly, reviewer 4 stated that, *instead of using avoid fried foods, it is better to suggest that people limit consumption of fast foods and ultra-processed foods*. The researcher decided to retain the words *avoid fried foods*, because the words suggested by the reviewer are too complex for the average Kenyan person, including people diagnosed with diabetes, to comprehend.

Requirement 3, as indicated below, was also reported to be partially met.

> *A product that will enable diabetes self-management by adults in Kenya should be designed to enhance existing and emerging support networks, which may include a communication strategy that is not fully dependent on health care providers’ input*

Only reviewer 2 indicated that this requirement was partially met. The researcher’s opinion on this feedback is that the concept of support networks and a communication

strategy in support networks is adequately displayed in various sections of the prototype. As such, no changes were implemented in the DSM guide in relation to support networks.

Requirement 4 was reported to have been partially met in the prototype DSM guide.

> *A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context*

Two of the reviewers, reviewers 1 and 2, indicated that this requirement was partially met. This DSM guide is designed to enable DSM and, in the long run, reduce over-reliance on the limited number of available health care providers. DSM is fostered by adapting a team approach (Ministry of Public Health and Sanitation, 2010c, pp. 2–3). For this reason, this DSM guide is designed to be used mainly by people who have been diagnosed with diabetes, with assistance from health care providers. Health care providers are meant to provide support, as opposed to taking the leading role in diabetes management. In addition, this guide has factored in lack of self-care resources. In view of this argument, the researcher was convinced that requirement 4 was fully met in the prototype DSM guide.

Requirement 5 was reported to be partially met by reviewers 2 and 4.

> *A product that will enable diabetes self-management by adults in Kenya should seek to facilitate the identification and management of diabetes-related stress, fears and denial using culturally congruent approaches*

Concerning this requirement, reviewer 2 stated that, *Kindly also deal with the major myths and misconceptions about diabetes and also other available channel to manage stress and depression among people living with diabetes.* The researcher had demystified misconceptions on insulin therapy in the prototype DSM guide. However, further review of the literature revealed that people diagnosed with diabetes and the community in general believed many other myths and misconceptions about diabetes. The myths and

misconceptions identified in the literature were, for instance, that “Diabetes is contagious, diabetes is a shameful disease, diabetes is a bad disease, diabetes can be caused by demons and witchcraft” (Lloyd *et al.*, 2022, p. 4). Because it is not possible to enumerate all the myths in all the communities in Kenya, the researcher indicated in the health care provider note section on page 2 of the prototype DSM guide, that health care providers need to identify and demystify any existing myths on what diabetes involves. Doing so is important, since such myths and misconceptions can negatively affect DSM.

Another comment on requirement 5 was made by reviewer 4*: Diabetes distress, burnout, anxiety, depression are common challenges when living with diabetes and should be given serious consideration. They can cause patients to stop caring for themselves which often leads to development of complications too early*. This is a valid point to note, however, the researcher is of the view psychological factors are adequately covered on pages 15 and 16 of the prototype DSM guide.

Requirement 9 was the next to be reported as partially met.

A product that will enable DSM by adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM

Two reviewers, reviewers 2 and 4, were of the opinion that this requirement was partially met. Reviewer 2 stated, *the psychosocial impact and effects of diabetes and how to deal with this is not well covered in this document.* The researcher contacted the reviewer telephonically to clarify what they meant by the psychosocial impact of diabetes. The reviewer clarified that they referred to problems, such as depression, anxiety and anger. These factors are already catered for in the prototype DSM guide under the topic of stress management. The researcher chose to use the term “stress” to refer to psychological factors, as this is the simplest term, and can be understood by lay people diagnosed with diabetes in Kenya. Reviewer 4 indicated that requirement 9 was partially met, while their comment was contrary to this opinion. Reviewer 4’s comment reads, *the guideline acknowledges patients’ attitudes to an acceptable extent and provides actionable solutions.* The reviewer was contacted, and their response was that they had intended to

tick on the option that indicated that the requirement was fully met. As such, expression of requirement 9 was not altered in the final DSM guide.

Requirement 10 was reported by one reviewer, reviewer 2, as having been partially met.

> *A product that will enable diabetes self-management by adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management*

Reviewer 2's comment on this requirement was as follows: T*here is a need to have session on available diabetes awareness channels or programs or even how to organize one and the benefits of these sessions*. The researcher was not able to get feedback from the reviewer to clarify the comment further. It seemed to the researcher that the comment was a further recommendation, and not necessarily directly aimed at the DSM guide. The rest of the reviewers were satisfied that this requirement was fully met.

Requirement 11 was reported as being partially met by two reviewers, reviewers 2 and 3.

> *A product that will enable diabetes self-management by adults in Kenya should be responsive to treatment options in this context*

Reviewer 2 stated, *The document addresses insulin therapy alone as the treatment modalities. There is a need to have a section on oral glucose lowering agents.* The researcher took notice of this comment, and identified that the option of oral glucose-lowering agents was presented on page 10 in the prototype DSM guide. Because there are different types of oral antidiabetic medications, and lay people living with diabetes may find it cumbersome to read about them in the DSM guide, the researcher only mentioned that the doctor can commence the patient diagnosed with diabetes on such treatment. The illustrations used in the prototype DSM guide further depict patients taking oral medication. However, it is crucial to provide individual patients with in-depth knowledge on oral glucose-lowering agents. Literature indicates that it is important to avail written information on oral hypoglycaemic agents to patients at the time of initial

prescription by the physician, as well as every time the pharmacist dispenses drugs (Kusturica *et al.*, 2020, p. 41). To avoid giving too much information, which may lead to confusion in patients with diabetes, such information can be provided on an individual basis, as the need arises.

This view reveals a possible study gap that could be investigated in the future, that of availing simple written information that is comprehensible to lay people living with diabetes on oral glucose-lowering agents. However, such a venture is outside the scope of this study. The best the researcher could do was to include a clause in the health care provider note, that health care providers should provide detailed information on oral glucose-lowering agents to patients commenced on such therapy. Literature indicates that such information can improve DSM (Kusturica *et al.*, 2020, p. 41). Reviewer 3 had an additional comment on requirement 11, which reads, *Treatment options are dependent on patient parameters such as age, sex, UECs, HbA1c, electrolyte levels and other comorbidities*. A clarification by the reviewer revealed that they meant that diabetes treatment should be individualised with regard to such parameters. This opinion was noted, although the reviewer's suggestions were not added to the DSM guide. The reason for this decision was that indicators for individualising treatment lies in the realm of the health care provider and not the patient diagnosed with diabetes.

Requirement 12 was indicated as having been partially met by only one reviewer.

A product that will enable diabetes self-management by adults in Kenya should be responsive to patients' concerns on self-care resources in this context

Only one reviewer, reviewer 2, was of the opinion that this requirement was partially met. They stated that, *Kindly use locally available graphics and illustrations, some of them are borrowed from the white population and may not speak to the Kenyan population.* Throughout the design, the researcher was very sensitive to keeping the DSM guideline culturally relevant to the Kenyan population, and used graphics to illustrate the African context of Kenyans, whilst adhering to legislation guiding image use.

Requirement 13 was reported to be partially met by two reviewers, reviewers 2 and 4.

> *A product that will enable DSM by adults in Kenya should contain an evaluation section for both the product and confidence in owns ability for DSM*

Concerning requirement 13, reviewer 2 indicated that, *This should be incorporated into the document, I haven't seen that part of self-evaluation.* The researcher's position on this comment is that the first page alludes to self-evaluation on DSM as a collaborative exercise between the patient and the health care provider. Several sections in the DSM guide also leads the patient into self-evaluation, especially while interacting with the health care providers. Still on requirement 13, a reviewer commented as follows: *This aspect on skills of DSM is given consideration. However, skills building is always ongoing with DSM and patients should be reminded to embrace lifelong learning and know to become experts on their own health and management.* The researcher took this as a valid point to consider in the DSM guide. Short-term diabetes self-management education programmes in Kenya have proven to be less than optimally beneficial for improving the glycaemic status of people diagnosed with diabetes (Gathu *et al.*, 2018, p. 6). Consequently, long-term learning is the best approach to improving the clinical outcome of people living with diabetes. In view of this comment, the researcher added a statement on the first page of the DSM guide to emphasise the need for lifelong learning on diabetes self-management.

Requirement 14 was reported to be partially met by two reviewers, reviewers 2 and 4.

> *A product that will enable DSM by adults in Kenya should contain information on diabetes-related mental illness and other comorbidities*

Reviewer 2 stated that, *The document covers stress management alone and doesn't provide information about the locally available resources to manage stress*. In turn, reviewer 4 commented that, *Since this is an introductory guideline, it covers essential*

aspects of mental health care but should also emphasize the importance of consulting with qualified medical practitioners when struggling with mental health challenges. The researcher reviewed literature with regard to mental health care for people diagnosed with diabetes. Literature recommends that people diagnosed with diabetes are screened for psychological distress, and if they have significant distress, depression or anxiety, they should be referred to specialised mental health care providers (Robinson *et al.*, 2018, p. S137). People living with diabetes who are found to have depression should be prescribed antidepressant medication. In the prototype DSM guide, the notes to the health care provider already emphasise that the health care provider should assess patients' level of stress and facilitate counselling services. To strengthen this aspect, the statement was enhanced to categorically indicate the need to refer patients with psychological problems to specialised mental health care providers. The literature indicates further that patients with diabetes who are depressed should be commenced on antidepressant medication (Robinson *et al.*, 2018, p. S137) and cognitive behaviour therapy (Robinson *et al.*, 2018, p. S135). A comment about treating depressed patients diagnosed with diabetes with antidepressants and cognitive behaviour therapy was added on the final product.

Requirement 15 was reported by one reviewer as being partially met.

A product that will enable DSM by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes

Reviewer 3 was of the opinion that the prototype DSM guide met this requirement partially. They commented, *When the tool is used by both [health care provider and patient diagnosed with diabetes], it ceases to be DSM. DSM should be patient focused.* Requirement 15 was derived from surveys that were conducted among health care providers (*cf.* 6.5.2.7), who were of the opinion that the product that will enable DSM by adults in Kenya should be used by the health care providers and patients diagnosed with diabetes. This DSM guide clearly distinguishes the section to be used by the patients and

that to be used by health care providers. The health care providers are clearly indicated as providers of support for DSM. In view of this, the researcher was convinced that the current procedure of use is necessary to enhance DSM. Therefore, the final DSM guide retains its current layout, with a section focusing on patients and another focusing on health care providers.

Although reviewer 1 was of the opinion that requirement 16 was fully met, they still questioned the procedure of use of the prototype DSM guide. This reviewer commented: *Going by the notes to health workers, is this guide to be used by health workers or it will be issued to patients? To avoid confusing the patient and having too much content for them, consider having two separate documents, one for health workers and one for the patients.* The correct position on who should use this DSM guide is that, this guide will be used mainly by patients diagnosed with diabetes and health care providers during clinic visits. It is important for the DSM guide to have the health care provider section and the patient's section, so that the patient can easily identify the help that they expect from the health care providers. In addition, the health care provider should be advised to use one section at a time, and this will reduce the amount of information given to the patient at any given time.

Requirement 17 was indicated as partially met by one of the reviewers.

> *A product that will enable diabetes self-management by adults in Kenya should contain instructions on how to use different sections of the product, how to reproduce the product and a cover page with provision of patient's personal details.*

Reviewer 2 indicated that this requirement was partially met. He stated, *The step by step instructions needs to be elaborate and provide a good guidance to the user on how to use the manual. Please provide these instructions*. This concern on elaborate instructions was noted by the researcher. However, the researcher reiterates that this was already provided for in the prototype DSM guide. Any section of the guide that befits chronological ordering of issues, is numerically numbered. The use of numbers as opposed to words

helped to avoid chances of having a guide that is too wordy and cumbersome to be used by patients who are lay people.

Requirement 18 was also reported to be partially met by one reviewer.

> *A product that will enable diabetes self-management by adults in Kenya should be designed in a format that the author perceives as most appropriate while allowing room for presentation of some sections in subsidiary formats as it deems necessary*

Reviewer 4 indicated that this requirement was partially met. They stated that, *the guideline is well put together for ease of use but could use a supporting format such as a PowerPoint presentation.* The format suggested by the reviewer was seen by the researcher as not appropriate for the lay people in the Kenyan context. The use of PowerPoint presentation would pose a technological challenge in the utilisation of this DSM guide, as it is evident that health care facilities in Kenya are still technologically challenged (Ondulo, Aduda and Rambim, 2020, p. 112). Therefore, the researcher decided to retain the format of the DSM guide in the proposed format.

On the other hand, reviewer 2 did not respond to the question on the extent to which requirement 18 was met. Instead, he had the following comment, *I didn't understand this question. I believe that the manual should not be developer specific but should meet the needs of the user and the country context.* While reflecting on the process that was applied to come up with this requirement, it is important to note that this DR was an output from data provided by health care providers, who were asked in a survey to indicate the format of a product that would enable DSM by adults in Kenya (Section 6.2.5.7). The survey participants did not discredit any of the formats that were presented to them. Therefore, the researcher had the liberty to choose any of the presented formats suitable for the presentation of this DSM guide. As such, the format chosen is user (patients diagnosed with diabetes and health care provider) friendly and not researcher friendly, as indicated by reviewer 2.

7.4.1.3 Reviewers' opinions on requirements that were not met at all and met partially in the prototype DSM guide

In this section, the three requirements, namely requirements 6, 7, and 8 that were reported by at least one reviewer as not having been met at all as well as having been met partially, are presented.

The first requirement with mixed reporting is 6.

> *A product that will enable diabetes self-management by adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities*

The reviewers had different opinions on requirement 6. Reviewers 1 and 3 felt that this requirement was fully met. Reviewer 2 indicated that this requirement was partially met. His specific comment was as follows: *I propose that you work with experts to review the diabetes complications part, how to prevent and/or delay the long term complications and how to prevent and manage the short term complications of diabetes.* The researcher notes the reviewer's comment. However, the researcher is of the opinion that all aspects of DSM addressed in this DSM guide works towards delaying progression of the disease and resultant complications. The focused nature of diabetes-related complications falls outside the scope of this DSM guide and could be explored outside this study.

The second requirement with mixed reporting is requirement 7.

> *A product that will enable diabetes self-management by adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations*

Reviewer 3 was of the opinion that requirement 7 was fully met. Two of the reviewers, reviewers 2 and 4, indicated that this requirement was partially met. Reviewer 2 said, *Need to revise the part for nutrition, physical activity and other lifestyle management practices,* while reviewer 4 indicated, *There is great information on exercise, sleep is not*

tackled in detail, exercise is given ample attention, but food requires so more detail too. Taking medications is well covered. Additionally, reviewer 1 was of the opinion that the requirement was not met. He stated, *The definition of diabetes is not factual. Not all diabetes is due to unhealthy lifestyle. For physical activity, be more explicit about the minimum duration per day, and number of days per week as per WHO recommendations.* Scrutinising the DSM guide confirmed detailed but simple guidance related to nutrition, physical activity and additional lifestyle practices that would improve health outcomes of patients. The researcher did, therefore, not add additional information to the DSM guide.

The WHO defines diabetes as a medical condition that is caused by a lack of insulin in the body or inability to use available insulin in the body, which leads to a state of hyperglycaemias (WHO, 2019, p. 6). The researcher edited the definition of diabetes in the DSM guide to align with the internationally recognised definition. This will serve to improve understanding of diabetes by people diagnosed with diabetes as they get information from other sources. In addition to clarifications on the definition of diabetes, reviewer 1 indicated that it is necessary to indicate the duration of exercising in the DSM guide. In relation to this comment, the researcher added relevant information (ADA, 2022, p. S67) on duration of exercises in the DSM guide. This will enhance the uptake of adequate physical activity among patients using the DSM guide.

The last requirement that exhibited mixed reporting was requirement 8.

> *A product that will enable diabetes self-management by adults in Kenya should be responsive to physical state/systemic illness, family history of diabetes, socio-economic status, education and age of people diagnosed with diabetes*

Reviewers 1 and 3 were of the view that this requirement was fully met. Reviewer 4 indicated that this requirement was partially met. Reviewer 4 indicated that, *the guideline tries to be mindful of all these aspects.* Reviewer 2 indicated that the requirement was not met, and stated, *this content is not well covered in this document.* The researcher designed the DSM guide and enshrined the variables, namely 1) physical state/systemic

illness, 2) age, 3) education level, and 4) socio-economic status, in the different sections of the DSM guide. The researcher added content in the section headed “What is diabetes” to reinforce the concept of family history of diabetes.

This brings to a conclusion the section on feedback on requirements section. The next section will cover the evaluation criteria.

7.4.2 Reviewers’ opinions on the extent to which evaluation criteria were met

The reviewers were asked to give their opinions on the extent to which the various aspects of the evaluation criteria, namely the goal, environment, structure, activity and evolution of the prototype DSM guide, were achieved. The findings will be presented in the listed order of these aspects.

7.4.2.1 Reviewers’ opinions on the extent to which the goal of the DSM guide was met

Reviewers were asked to indicate their opinions on the extent to which the goal of the DSM guide, specifically its efficacy, validity and generality, had been achieved. Concerning the first aspect of the goal, efficacy of the DSM guide, all the reviewers indicated that the DSM guide fully achieved it. Concerning the second specific aspect of the goal, validity, three of the reviewers were of the opinion that this criterion was partially met. Validity of the DSM guide indicates whether the DSM content was sound. None of the reviewers specified the content that they thought was partially sound. On the third aspect of the goal of the DSM guide, generality, only one reviewer, reviewer 2, expressed that the generality of the DSM guide was partially achieved. Reviewer 2 indicated that some of the content had been omitted or was partially covered. The researcher was not successful in obtaining further clarification from this reviewer to incorporate feedback meaningfully and, therefore, had to dismiss these specific comments.

7.4.2.2 Reviewers' opinions on the extent to which the criterion of environment was achieved in the DSM guide

Reviewers were asked to evaluate the extent to which the criterion of environment, which included the aspects a) consistency with people diagnosed with diabetes, and b) consistency with technology, were achieved.

i) Reviewer's opinions on the extent to which the criterion of consistency with people diagnosed with diabetes was achieved

For greater precision, the aspect of environment was divided further into utility, understandability, ethicality, and side effects of the DSM guide. Utility, which refers to the usefulness of the DSM guide for DSM, was unanimously indicated by all four the reviewers as having been fully met. Concerning understandability, which was defined as the character of the DSM guide making it easy to understand for health care providers and patients diagnosed with diabetes, all four the reviewers indicated that this criterion was fully met. Only one reviewer indicated that the next characteristic of environment, ethicality, which referred to the DSM guide being ethically and morally sound, was only partially met. Since this reviewer did not substantiate the aspects of the DSM guide that were seen to partially meet the criteria of ethicality, and because the other three reviewers indicated that this aspect was fully met, the view of reviewer 1 was not considered in designing the final DSM guide.

The last characteristic relating the consistency of the DSM guide with people diagnosed with diabetes, is side effects, which is the characteristic that would ensure that using the DSM guide does not pose any threat of adverse effects to people diagnosed with diabetes. Two reviewers, reviewers 1 and 4, indicated that this criterion was partially achieved, with reviewers 2 and 3 indicating that this criterion was fully met. Reviewer 1 clarified that, if all aspects that had been pointed out are revised, then the DSM guide would not pose a threat to people diagnosed with diabetes. Since the researcher addressed all feedback from the reviewers while designing the final DSM guide, the

concern that the DSM guide could have adverse effects on people diagnosed with diabetes, was addressed.

ii) Reviewers' opinions on the extent to which the DSM guide met the criterion of consistency with technology

Regarding the criterion of consistency with technology, all four the reviewers agreed that the DSM guide can utilise available technology, such as computers, printers, cell phones, common software programs and common social media platforms in Kenya. This characteristic of the DSM guide is crucial for improving accessibility of the DSM guide for the people diagnosed with diabetes in Kenya.

7.4.2.3 Reviewers' opinions on the extent to which structure was achieved in the DSM guide

The reviewers were asked to give their opinions on the extent to which the structure, which includes completeness, simplicity, clarity, style, homomorphism, and consistency, were achieved in the DSM. The findings on these aspects are reported as follows.

i) Reviewers' opinions regarding the completeness of the prototype DSM guide

All four the reviewers indicated that the prototype DSM guide was partially complete. This opinion was considered by the researcher. The specific sections indicated as incomplete were identified by the reviewers as they addressed the 19 requirements of the DSM guide. Therefore, the final DSM guide was designed to specifically address sections identified as having been partially met or not met at all.

ii) Reviewers opinions on simplicity and clarity, fidelity to the modelled phenomenon, homomorphism, and consistency

The reviewers were of the opinion that the structural components of simplicity and clarity, fidelity to the modelled phenomenon, homomorphism and consistency were fully achieved in the prototype DSM guide. As such, the final DSM guide is presented with the same aspects of being upheld.

iii) Reviewers' opinions on style of the prototype DSM guide

One of the reviewers, reviewer 1, was of the opinion that the style of the prototype DSM guide – which refers to the appeal and acceptance of the guide to potential users – was partially met. With reference to this view, the reviewer referred to the suitability of some of the photos (*cf.* 7.4.1.2). This opinion was considered and the photos were modified in the final DSM guide.

7.4.2.4 Reviewers' opinions on the extent to which the activity criterion of the DSM guide was achieved

The activity criterion that the reviewers evaluated included characteristics such as completeness of activity, consistency of activity, accuracy and efficiency. Concerning completeness of activity, which refers to the ability of the DSM guide to meet all requirements, was reported by three of the reviewers as partially met. A similar view was given concerning accuracy, which is the correctness of DSM guide information. These findings are consistent with the participants' feedback on the 19 requirements discussed in Section 7.4.1. In addition to the amendments made to improve the 19 requirements in the final DSM guide, the criteria of completeness of activity and accuracy were also achieved. Two of the activity criteria, namely consistency of activity and efficiency, were reported to be fully achieved in the prototype DSM guide. It is concluded that the final DSM guide demonstrates consistency of activity and efficiency.

7.4.2.5 Reviewers' opinions on the extent to which the evolution criteria were achieved in the prototype DSM guide

The last criterion that was presented to the reviewers was evolution of the DSM guide, which refers to robustness and learning capability of the DSM guide. Robustness, which refers to the extent to which the DSM guide can be tested and retested over time, was reported to fully met by three of the reviewers. One reviewer, reviewer 1, was of the opinion that this requirement was partially met. However, the users will be given the opportunity to evaluate the content, procedure of use and layout of the DSM guide

periodically. Concerning the learning capability of the prototype DSM guide, all four the reviewers were of the opinion that the prototype DSM guide has the capability of being improved over time, as it is used.

7.5 REVIEWERS' GENERAL EVALUATION OF THE PROTOTYPE DSM GUIDE

A general evaluation of the prototype DSM guide was the last section that the reviewers provided feedback on. In this section, reviewers were asked to give their general impression on the procedure of use, content, and general layout of the prototype DSM guide.

7.5.1 Reviewers' general impression of the procedure of use of the DSM guide

On the general impression of use, the reviewers gave varied views – this was an open section in which the participants used their own words to express their views. Reviewer 1 simply stated that the procedure of use was *good.* Reviewer 2 indicated, *please make use of technical experts in the development of the content for validity and acceptability.* This comment did not fit into this specific section of the general impression of the prototype DSM guide; therefore, this comment will be addressed in the next section, on the general impression of the content of the prototype DSM guide. Reviewer 3 stated that *the procedure of use is ok and well organized.* Reviewer 4 stated, *the guidelines for use are very simple, clear, and straightforward. The use of pictures really complements ease of use such that even where language barriers may exist, the illustrations may transcend that.* From the views of the reviewers, it is evident that the procedure of use of the prototype DSM guide was acceptable. Therefore, the procedure of use that was expressed in the prototype DSM guide was adapted in the final DSM guide.

7.5.2 Reviewers' general impression of the content of the prototype DSM guide

In this section, just like in the previous section, each reviewer gave their personal views on the general impression they had of the content presented in the prototype DSM guide. Reviewer one indicated that, *The content needs to be relooked at. Some content is not factual.* This reviewers' concern related, specifically, to the definition of diabetes. This

concern was addressed, and the definition of diabetes was aligned to the standard definition of diabetes that is recognised internationally. Reviewer 2 had a similar comment on the content of the prototype DSM guide, namely, *Diabetes is not caused by unhealthy lifestyle as presented in the document (Diabetes is a lifelong (Chronic) condition that is characterized by high blood glucose (Sugar) due to the inability of the body to produce enough/no insulin at all, or the body not using the insulin produce well or both situations can occur).* This concern had already been considered and addressed appropriately. Reviewer 2 also stated, *Please make use of technical experts in the development of the content for validity and acceptability.* This reviewer's opinion was that there was a need for more experts to be involved in the development of the content. However, in line with the design of this study, it was planned that the prototype was to be evaluated by only a few diabetes experts. Due to constraints on resources, such as time and money, ex-post evaluation is recommended (Venable, Pries-heje and Baskerville, 2012, p. 11).

Reviewer 3 commented that, *the content for the patients is adequate, but partially adequate for health care provider's role. The content should be guided by other parameters as stated in number 11*. This opinion was noted. The rationale for retaining the health care provider section in the final DSM guide as it was in the prototype DSM guide is that health care providers are already trained on how to care for patients diagnosed with diabetes. There exist other comprehensive diabetes management protocols that health care providers can refer to. This DSM guide is mainly to be used by the people diagnosed with diabetes, with minimal prompts to ensure that health care providers assist patients to achieve DSM.

Reviewer 4 had the following comment on the content of the prototype SM guide: *This guideline seems to be addressing type 2 diabetes specifically. It would be helpful if it explicitly addresses it as that, rather than using diabetes as a general description since there are several different types of diabetes mellitus and type 1 diabetes is not directly caused by lifestyle choices per se. If type 1 diabetes is to be tackled by this guideline too, I suggest that it clearly differentiates the two conditions. On page 8, kindly add a recommendation to check blood sugar before the onset of exercise since it is important*

to know how the blood sugar is to prevent hypoglycaemia occurring. On page 11, add the step where the patient should first pull air into the syringe that is equivalent to the insulin dose they want to take, insert the needle and push the air into the bottle, then proceed to pull out the medicine and inject. This is important to avoid a vacuum being created within the bottle that can suck impurities into the medicine making it ineffective over time. This applies to insulin vials though it is usually forgotten.

Concerning this reviewer's first concern, on the difference between Type 1 and Type 2 diabetes, it is important to note that the definition of diabetes was modified. In addition, at the time of diagnosis, it may be difficult to tell whether the patient has Type 1 or Type 2 diabetes (ADA, 2022, p. S17). Type 1 and Type 2 diabetes can occur at any age – in children and adults (ADA, 2022, p. S17). Since the principles of diabetes management apply to both types of diabetes, and since adults can be diagnosed with any of the types of diabetes, the DSM guide is broad enough to cater for people diagnosed with either Type 1 or Type 2 diabetes. This reviewer's second comment was that it was necessary to add a recommendation on checking blood sugar before starting exercises. This comment was noted and this information was added on page 8 of the final DSM guide.

Reviewer 4 also recommended that more information related to preparation of an injection should be added. This was considered a valid point that could assist the patient to draw an adequate amount of insulin into the syringe, and it is supported by literature (Bahendeka *et al.*, 2019). Therefore, the final product was modified to add this step on the preparation of insulin injection.

7.6 REVIEWERS' GENERAL IMPRESSION OF THE LAYOUT OF THE PROTOTYPE DIABETES SELF-MANAGEMENT GUIDE

Like the previous two sections on reviewers' general impressions of the prototype DSM guide, this third, last, section on the general evaluation was open for reviewers to give their views using their own words. Reviewer 1 indicated that the general layout was *good*. Similarly, reviewer 2 stated, *General impression on layout, the layout of the document is perfect, easy to use and caters for the needs of adults living with diabetes.* Reviewer 3

commented, *The evaluation should come on the last page*. Concerning this comment, the researcher can report that the evaluation of the DSM guide and DSM is continuous throughout the guide. This is purposefully suggested, as the guide is designed to be used in sections, as opposed to the use of the whole DSM guide at once. Doing so, therefore, means that the evaluation is performed best in the different sections of the DSM guide. Finally, reviewer 4 stated, *The flow of content is great. I appreciate that the information provided builds gradually allowing for comprehensive information flow that allows interaction and understanding. I also think adding an abbreviation section would be great to increase ease of use for the guideline.* Concerning the addition of abbreviations, the position of the researcher is that no abbreviations are used in text of the DSM guide. Therefore, there is no indication for adding an abbreviation list on the DSM guide. In view of the above arguments, the researcher maintained the general layout of the final DSM guide as it was displayed in the prototype DSM guide.

7.7 CONCLUSION

In conclusion, findings from the expert reviewers on the prototype DSM guide were discussed in detail. The general layout of the DSM evaluation form was presented briefly, as were the experts' demographic data. In this chapter, the experts' opinions on the extent to which the 19 requirements were achieved, and the extent to which the adapted evaluation criteria of Prat *et al.* (2015) were achieved, were reported. Diabetes experts' specific comments on the aforementioned criteria and their general impression of the prototype DSM guide were presented and discussed in the spirit of contextual and literature relevance. In line with these discussions, all valid concerns were considered in the design of the final DSM guide, as illustrated in Addendum 9.

CHAPTER 8
PRESENTATION OF THE FINAL PRODUCT, STUDY LIMITATIONS, CONCLUSIONS, RECOMMENDATIONS AND VALUE OF THE STUDY

8.1 INTRODUCTION

In Chapter 7, the views of the expert reviewers were considered in the design of the final product of this study. In this final chapter of this study, the researcher will refer to the final product that was designed, and discuss the study limitations, conclusion, recommendations and the value of the study. The design knowledge of this study, in the form of six design principles, will be presented under the recommendations of the study.

8.2 PRESENTATION OF THE FINAL PRODUCT

Having applied the iterative phases of DSR in this study, the final product that emerged is a brief and comprehensive DSM guide entitled, ***Diabetes self-management made simple; a step-by-step guide*** (*cf.* Addendum 9). This guide was designed, using relevant infographics, for adults living with diabetes in the Kenyan context. This guide is designed to allow for its evolution in future, once it has been piloted. Future review of this guide is the prerogative of the researcher, considering that the researcher retains the original template that was used to design this guide. This guide is designed in a way that it can be used in the form of a printed hard copy, as well as a soft copy that can be accessed via social media platforms and mass media, such as daily newspapers. The final DSM guide has nine sections, namely a) Defining diabetes, b) Diagnosing diabetes, c) Support networks in DSM, d) Food choices and food availability for DSM, e) Physical activity in DSM, f) Medication in DSM, g) Blood glucose monitoring, h) Blood glucose monitoring in DSM, i) Peer support in DSM, and j) Stress management in DSM (*cf.* Addendum 9).

8.3 STUDY LIMITATIONS

This study faced two limitations, which will be acknowledged by the researcher in this section.

The first study limitation was that the final product that was developed – the DSM guide was not piloted among patients diagnosed with diabetes and their health care providers. Because the scope of the study was already extensive, the researcher elected to follow an iterative in-product evaluation procedure for the development of the product, instead of post-facto, final evaluation. In DSR, evaluation takes an iterative nature between the different phases of the study, and responses by the end users of the product are observed. In this study, evaluation was achieved by exposing the product to diabetes experts. Peffers *et al.* (2007, p. 56) indicate that design science researchers have leeway to decide on iterations they can undertake in evaluating their product, depending on the nature of their research. In this study, which was an academic research study, it was not feasible for the researcher to expose the product to the end users for evaluation, because of constraints caused by resources such as time and money. In addition, the scope of the study already met the requirements for formal studies for doctoral degrees and, as such, piloting and final evaluation of the product would have exceeded this scope. The impact of this limitation on the final product is that the feedback of the end users (patients and health care workers) is not included in the final product. However, this study has unveiled a novel way of developing context-specific products for DSM. Researchers who have sufficient time and money can adapt this study methodology, and conduct all possible iterations with no limitations.

The second limitation that was experienced in this study was the inability to trace one of the diabetes experts for clarification on some of the comments they had provided in the initial response while evaluating the prototype DSM guide. Because of their lack of response, the researcher could not incorporate all their comments in the design of the final product. The third limitation of this study arose from the fact that survey findings were analysed using descriptive statistics. Although this analysis was sufficient for the researcher to achieve their objective in conducting the surveys, questions that related to practical implementation of the product may have benefited from deeper interpretation. On a positive note, though, this limitation provides another opportunity for future research.

8.4 CONCLUSION

Diabetes is a chronic condition that is on the increase in LMICs, of which Kenya is one. Since diabetes is a chronic condition, the concept of DSM is key for controlling this condition. However, most patients diagnosed with diabetes have uncontrolled diabetes. This is an indication that DSM is not adequately practiced by patients living with diabetes.

In view of this situation, this study aimed at designing a context-specific product that is intended to enable DSM by adults in Kenya, as guided by IMBP distal variables, namely, a) Culture, b) Demographic variables, c) Attitudes towards targets, such as stereotypes and stigma, d) Personality, moods and emotions, e) Other individual differences, such as perceived risks, and f) Exposure to media and other interventions. This study was anchored on distal variables of the IMBP theory, because this theory supports the development of context-specific interventions for people who share similar background factors, which are also referred to as distal variables.

The context-specific product, which emerged as a DSM guide (see Addendum 8B), was designed by applying three interrelated cycles of DSR in a pragmatic approach to product development, namely, relevance, design and rigour (Hevner and Chatterjee, 2010, pp. 17–18) were adapted to come up with three executable phases. The executable phases that were applied in this study in an iterative process, were aligned to the general methodology of DSR. These executable phases are, a) Problem explication, b) Design, and c) Evaluation. The following is a brief outline of what was entailed in each of the study phases and the application of the IMBP theory in the different phases of the study, alongside the outputs of each of the phases.

In the first DSR cycle, the relevance cycle, which was adapted as the problem explication phase of this study, detailed investigation into the problem on DSM was conducted through various methods, with each method achieving a specific objective. The first method that was applied was a literature overview which enabled the researcher to present IMBP distal variables that influence DSM by adults. From the literature overview, four IMBP distal variables, namely, cultural factors, demographic factors, individual differences and environmental factors, were identified as influencing DSM. In addition to

the list of distal variables that influence DSM, the literature overview gave rise to the first PDR that is presented below.

PDR 1: A product that will enable DSM by adults in the Kenyan context could be used primarily by patients diagnosed with diabetes

The second method that was used in the problem explication phase was a scoping review. Analysis and integration of the scoping review data resulted in eight categories and several subcategories that supported seven IMBP related distal variables, namely a) Culture, b) Demographic factors, c) Psychological/emotional factors, d) Diabetes education/awareness, e) Self-care resources/infrastructure, e) Support networks, and f) Diabetes medical management/complication prevention. These variables guided the formulation of eight more PDRs, giving a total of nine PDRs, which were considered as the tentative indicators of a product that would enable DSM by adults in LMICs. These nine PDRs were integrated with findings of the third and final method of the problem explication phase of this study, which enabled the researcher to derive DRs that formed the basis of designing the DSM product.

The third method used in the problem explication phase, was Kawa group discussions among Kenyan adult patients diagnosed with diabetes. The participants were asked to use the metaphor of a river to identify things that hindered or enabled their river to flow. Findings from the Kawa group discussions gave rise to two themes, namely enablers of effective DSM, and barriers to effective DSM. Each of these themes was supported further by various categories and themes, which followed the pattern of IMBP distal variables. The PDRs that resulted from the scoping review, and that were supported by context-specific data in the Kawa group discussions, were extrapolated to become DRs. Those PDRs that were not supported by data from the Kawa group discussions were considered in the next phase, Phase 2 of this study, which is the design phase that corresponds to the second cycle of DSR, the design cycle.

In design phase, the researcher initially conducted a survey among diabetes health care providers in Kenyan health facilities. The survey focused on finalising the content and

exploring the practicability of the use of a DSM product for adults in Kenya. The questionnaire that was used in the survey was informed by the findings that were obtained in the problem explication phase. The data from the survey was analysed and presented in line with IMBP distal variables. The survey results also gave rise to additional DRs, and strengthened unsupported PDRs, resulting in a total of 19 DRs. The 19 DRs informed the design method that was the second method that was applied in this phase. The researcher designed the evaluation criteria and the prototype DSM product that were used by a panel of diabetes experts in the third phase of this study. The evaluation criteria were designed, considering the 19 DRs that were formulated on the basis of IMBP distal variables that emerged through the first two phases of the study, as well as by adapting the evaluation criteria of Prat *et al.* (2015).

The third, and last, phase of this study was evaluation, which corresponds with the rigour cycle of DSR. In the evaluation phase, diabetes experts were contacted by email to evaluate the prototype DSM guide against the set evaluation criteria. The experts' views were considered in the design of the final DSM guide. In addition to this, design knowledge that was generated throughout the study was articulated. These are presented as six design principles (see Section 8.5.2). The study aim, namely, designing a context-specific product that would enable DSM by adults in Kenya, is reached by means of a guide for DSM, designed for adults in Kenya. Having designed a DSM guide and design knowledge following a DSR approach, the researcher makes the following recommendations.

8.5 RECOMMENDATIONS

The researcher recommends that:

1) The DSM guide that emerged as the final product in this study should be piloted in a future study, to enable experiential data on the end users' use of the guide.
2) Future researchers can apply the design knowledge that was generated throughout the design of the DSM guide in designing self-management products

for their contexts. Articulation of the design knowledge yielded the following six design principles that can be applied in future studies.

If you want to design a product for the purpose of enabling self-management of a chronic medical condition by people living in LMICs, you are best advised to:

i. Give the product characteristics of the end-user profile, such as demographic factors, cultural factors, personality/moods/emotions, exposure to interventions and individual differences, and to do that by conducting a detailed literature review that is context specific, and can reveal possible background variables that influence self-management of the specific condition, as well as scientifically identifying relevant background variables of the end users.

ii. Give the product characteristics that reinforce enablers of self-management, while practically tackling barriers to self-management, and to do that by using a projective technique with concrete metaphors that can be expressed by the study participants, in a face-to-face session, in order to enrich depth of information gathered and answer questions during the session.

iii. Give the product characteristics of recommended policy guidelines in a simplified format that is acceptable and accessible to the users, and to do that via a format that is cost effective, to ensure adherence to recommended policy guidelines.

iv. Present the product in a multivariate format, and to do that via adaptation of distinct sections in the product, with each section addressing a specific self-management component, because such a format will enable the user to either use each section separately, or to combine sections.

v. Give the product evolution characteristics, and to do that by ensuring that the product exhibits robustness and the ability to be improved in the future, in order to make it more relevant to users over time.

vi. Give the product characteristics of efficacy, validity and generality, and to do so by engaging experts in the relevant field to review the product, because they can assist in assessing whether the product achieves its goal.

3) The final DSM guide that emerged at the end of this study should be reviewed periodically to incorporate more context-specific details that will be raised by the end users.
4) The future use of the DSM guide opens up further research possibilities in the field of DSM and researchers are encouraged to explore how the product can be utilised to enable expansion of the body of knowledge on DSM in various contexts.

8.6 VALUE OF THE STUDY

Design science research methodology is a new approach to conducting research in health-related fields. Therefore, the study approach may stimulate interest among health care researchers who are seeking to develop products that are specific to their contexts. This will assist health care providers to diversify their approaches to conducting research.

The DSM guide that was designed in this study could help to improve diabetes management by and outcomes for adults diagnosed with diabetes in Kenya. It is anticipated that individual patients living with diabetes will be likely to experience better outcomes, which will enable them to continue performing their roles in their families. Individual adults diagnosed with diabetes could live longer, and have more productive years, as opposed to fewer productive years that could be the case if their health is compromised.

Families of adults diagnosed with diabetes will benefit from this study by facing reduced costs for supporting their kin in the management of diabetes. There will be reduced strain on health facilities, because adults diagnosed with diabetes are likely to experience healthier lives when they adhere to recommended DSM.

Design knowledge gained from this study will assist other health-related researchers to develop similar products in the future.

8.7 CLOSURE

In parting, the main aim of this study, which was to design a context-specific product that would enable DSM by adults in Kenya, was achieved. In addition, the specific objectives of this study were achieved in the various phases of the study. In the first phase of the study, the problem explication phase, the researcher was able to achieve the first three objectives, namely, presentation of distal variables that influence DSM by adults, identification of PDRs which were considered as tentative indicators for a DSM product for adults in LMICs, and exploration of barriers and enablers of DSM by adults in Kenya were realised. In the second phase of this study, the design phase, the researcher was able to achieve two specific objectives, which include finalisation of the content and exploration of the practicability of the use of a DSM product by adults in Kenya, and designing of the evaluation criteria and the prototype DSM product. Finally, in the third phase, the evaluation phase, the researcher was able to achieve final three specific objectives, which were obtaining expert opinions on the prototype DSM guide, adapting of the prototype product and designing the final product, and articulation of design knowledge.

As a researcher, I'm happy to have applied the DSR methodology to designi a product that may enable DSM by adults in Kenya. As a researcher, I celebrate this work, which has emerged as novel application of this methodology in the field of nursing. I look forward to piloting the DSM guide in future research.

I am forever grateful to my supervisors, Prof. Marianne Reid, and Juanita Swanepoel, for the support I received from them in the application of the DSR methodology in my PhD research study. I would like to encourage researchers who would wish to use the DSR methodology in the development of self-management products for their contexts, to embrace the DSR methodology in their work.

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ADDENDUM 1: DSM PROTOTYPE GUIDE EVALUATION CRITERIA

The evaluation criteria that were designed in this study comprises of three sections namely, i) the extent to which the 19 design requirements were achieved, ii) the adapted Prat et al evaluation criteria and iii) General evaluation of the DSM prototype guide.

Section A: Extent to which the 19 design requirements were achieved

This criterion aims at evaluating the designed prototype guide against the design requirements that emerged throughout the phases of the study. Specifically, this criterion seeks to identify if the DSM prototype guide:

- Meet requirement fully: The requirement is fully demonstrated in the DSM guide.
- Meet criteria partially: The requirement is demonstrated in the DSM guide to some extent, although not exhaustively.
- Does not meet criteria: The requirement is evidently missing in the DSM guide

The 19 design requirements referred to in this criterion are as follows.

DR 1: A product that will enable diabetes self-management among adults in Kenya should be sensitive and responsive to the financial burden of diabetes management.

DR 2: A product that will enable diabetes self-management among adults in Kenya should address challenges associated with food choices, food availability and food security in a practicable and executable manner'

DR 3: A product that will enable diabetes self-management among adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.

DR 4: A product that will enable diabetes self-management among adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context.

DR 5: A product that will enable diabetes self-management among adults in Kenya should seek to facilitate the identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.

DR 6: A product that will enable diabetes self-management among adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities.

DR 7: A product that will enable diabetes self-management among adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations.

DR 8: A product that will enable diabetes self-management by adults in Kenya should be responsive to physical state/systemic illness, family history of diabetes, socio-economic status, education and age of people diagnosed with diabetes.

DR 9: A product that will enable DSM by adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM

DR 10: A product that will enable diabetes self-management by adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management.

DR 11: A product that will enable diabetes self-management by adults in Kenya should be responsive to treatment options in this context.

DR 12: A product that will enable diabetes self-management by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.

DR 13: A product that will enable diabetes self-management by adults in Kenya should contain an evaluation section for both the product and confidence in owns ability for DSM.

DR 14: A product that will enable diabetes self-management by adults in Kenya should contain information on diabetes related mental illness and or other comorbidities.

DR 15: A product that will enable diabetes self-management by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes.

DR 16: A product that will enable diabetes self-management by adults in Kenya should be written using simple terminologies in a language that is appropriate and acceptable to patients with diabetes.

DR 17: A product that will enable diabetes self-management by adults in Kenya should contain instructions on how to use different sections of the product, how to reproduce the product and a cover page with provision of patient's personal details.

DR 18: A product that will enable diabetes self-management by adults in Kenya should be designed in a format that the author perceives as most appropriate while allowing room for presentation of some sections in subsidiary formats as it deems necessary.

DR 19: A product that will enable diabetes self-management by adults in Kenya should be circulated through easily accessible channels including most commonly used social media platforms and mass media.

Section B: Adapted Prat et al. evaluation criteria

In this second section of the evaluation criteria, the researcher adapted some of Prat et al's (2015) evaluation criteria characteristics, that were applicable for the evaluation of the designed DSM prototype guide. These evaluation criteria aimed at identifying if the DSM prototype guide:

- Meets criteria fully: The criterion is fully achieved in the diabetes self-management prototype guide
- Meets criteria partially: The criterion is demonstrated in the diabetes self-management guide to some extent, although not exhaustively.
- Does not meet criteria: The criterion is not achieved at all in the diabetes self-management prototype guide

The following characteristics and specific components of these characteristics of the DSM prototype guide were evaluated:

Criteria			Description of the criteria
1. Goal	a) Efficacy		The DSM guide will most likely enable diabetes self-management
	b) Validity		The content in the DSM guide is sound.
	c) Generality		The DSM guide covers the range of topics related to DSM as required.
2. Environment	a) Consistency with people diagnosed with diabetes	i. Utility	The DSM guide is useful for the self-management of diabetes.
		ii. Understandability	The DSM guide is easy to understand by the patient and health care worker.
		iii. Ethicality	The DSM guide is ethical and morally sound.
		iv. Side effects	Use of the DSM guide does not hold any threat of adverse effects.
	b) Consistency with technology		The DSM guide can be used by utilising available technology. E.g. Computers, printers, cell phones, common software programs and common social media platforms in Kenya.
3. Structure	a) Completeness		The product enhances diabetes self-management in totality.
	b) Simplicity		The product is not complicated and can be used and understood in a simple way.
	c) Clarity		Information in the product is clear, and clearly presented.
	d) Style		The product appeals to a potential user and is presented with an acceptable level of elegance.

	e) Hormo-morphisism	i) Correspondence with other models	The DSM guide has similar features as other existing diabetes self-management products but does not duplicate the structure of already existing products.
		ii) Fidelity to modelled phenomena	The product is aligned to the main concepts of diabetes self-management.
	f) Consistency		The diabetes self-management product displays sufficient uniformity in its structure.
4. Activity	a) Completeness of activity		The DSM guide enables the full scope of recommended requirements.
	b) Consistency of activity		The DSM guide follows the same layout consistently.
	c) Accuracy		The information presented in the product is correct.
	d) Performance		People diagnosed with diabetes can use the different sections of the DSM guide with minimal effort
	e) Efficiency		The DSM guide can be used in a cost-effective and timesaving manner.
5. Evolution	a) Robustness		The DSM guide seems able to be tested and re-tested over time
	b) Learning capability		The DSM guide seems able to be improved over time as it is implemented.

Section C: General evaluation of the DSM prototype guide

This section of the evaluation criteria was designed as an open section with the aim of guiding the reviewers to give their general impression of the DSM prototype guide with regard to:

- The procedure of use
- The content
- The general layout of this prototype guide.

ADDENDUM 2: ETHICS APPROVALS

Addendum 2A: HSREC final approval

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

Health Sciences Research Ethics Committee

10-Aug-2021

Dear **Mrs Esther Opisa**

Ethics Number: UFS-HSD2019/1851/2502-0003

Ethics Clearance: **ENABLING ADULT DIABETES SELF-MANAGEMENT IN A KENYAN CONTEXT: A DESIGN SCIENCE RESEARCH APPROACH**

Principal Investigator: **Mrs Esther Opisa**

Department: **School of Nursing Department (Bloemfontein Campus)**

Submission Page

SUBSEQUENT SUBMISSION APPROVED

With reference to your recent submission for ethical clearance from the Health Sciences Research Ethics Committee. I am pleased to inform you on behalf of the HSREC that you have been granted ethical clearance for your request as stipulated below:

Phase two survey data collection will be conducted using hard copy questionnaires as opposed to the initial proposed electronic questionnaires.
Time frame is amended.
Participants' information sheet is amended.
Updated informed consent form.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; International Council for Harmonisation (ICH) Harmonised Guideline, Integrated Addendum to ICH E6(R1), Guideline for Good Clinical Practice (GCP) E6(R2), 2016, SAHPRA Guidelines as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this request for ethical clearance and we wish you continued success with your research.

Yours Sincerely

Prof. A. Sherriff
Chairperson : Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
IRB 00011992; REC 230408-011; IORC 0010096; FWA 00027947
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box C40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

Addendum 2B: Mount Kenya University Ethics Review Board Approval

Mount Kenya University

REF: **MKU/ERC/1837**
TO: **ESTHER OPISA**

Date: 23 June 2021

REG: **2018725131**

Dear Sir/Madam,

RE: ENABLING ADULT DIABETES SELF-MANAGEMENT IN A KENYAN CONTEXT: A DESIGN SCIENCE RESEARCH APPROACH

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **910.** The approval period is **23/06/2021 - 22/06/2022.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including informed consents, study instruments, MTA will be used
i. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
ii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Dr. Peter G. Kirira
Chairman, Mount Kenya University IERC

Addendum 2C: National Commission of Science Technology and Innovations Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 636905

Date of Issue: 07/July/2021

RESEARCH LICENSE

This is to Certify that Ms.. ESTHER ASENAHABI OPISA of University of the Free State, has been licensed to conduct research in Kakamega, Laikipia on the topic: ENABLING ADULT DIABETES SELF-MANAGEMENT IN A KENYAN CONTEXT: A DESIGN SCIENCE RESEARCH APPROACH for the period ending : 07/July/2022.

License No: NACOSTI/P/21/11547

636905

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

ADDENDUM 3: INSTITUTIONAL APPROVALS

Addendum 3A: Laikipia County Director of Health

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF LAIKIPIA
DEPARTMENT OF MEDICAL SERVICES AND PUBLIC HEALTH

OFFICE OF THE CHIEF OFFICER
P.O. Box 1271-10400,
Nanyuki, Kenya

Ref: CGL/HEALTH/RESEARCH/VOL.1/25 Date: 3rd February, 2020

ESTHER OPISA
DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

RE: RESEARCH AUTHORIZATION

This is to grant you authority to undertake a research on "Enabling diabetes self-management in the Kenyan context" A design science Research Approach in Nanyuki County Teaching & Referral Hospital, Laikipia County for the period of February 2020 to November 2020.

This is pursuit of a PhD at university of the Free State, South Africa.

Please share your findings with department of Health, County Government of Laikipia.

I take this opportunity to wish you success in your research.

Yours faithfully,

COUNTY GOVERNMENT OF LAIKIPIA
CHIEF OFFICER
03 FEB 2020
SIGN.....

DR. DONALD MOGOI
Ag. CHIEF OFFICER
MEDICAL SERVICES & PUBLIC HEALTH

Cc. CEC Health
County Director, Medical Services
Ag. CEO, NTRH

Addendum 3B: Kakamega County Director of Health

KAKAMEGA COUNTY

Telephone: 065 31125
E-mail: pdmswestern@gmail.com
Whenreplyingpleasequote

Ref. No. CGK/MOH/CDHR/Vol.2/20/02

CHIEF OFFICER, HEALTH SERVICES
P O BOX 2309 - 50100
KAKAMEGA

Date: 17th January 2020

COUNTY GOVERNMENT OF KAKAMEGA

The Medical Superintendent, KCGH.

RE: AUTHORITY TO DO RESEARCH

The matter refers

This is to allow Ms. Esther Opisa, a Doctor of Philosophy candidate at the University of the Free State, South Africa to carry out a research at the Kakamega County Referral Hospital, titled "*Enabling adult Diabetes self-management in a Kenyan Context: a design science research approach* ." This is following **NACOSTI Ethical** authorization vide letter **Ref: NACOSTI/P/20/3120**dated9th **January 2020**and the Mount Kenya University ERC as per the letter **Ref: MKU/ERC/1514** dated **26th November 2019**.

This authorization is subject to compliance with the requirements spelt out in the ethical approvals as has been undersigned therein.

Kindly accord her the necessary assistance as she carries out the research.

Thank you.

17 JAN 2020

Dr. Mutiani Ayub Wastara
Ag. County Director Medical Services
KAKAMEGA COUNTY

Copy to: -

- Chief Officer Medical Services
- Ag. County Director Public Health

Addendum 3C: Nanyuki County Referral Hospital Chief Executive Officer

Esther Opisa,
Faculty of Health Sciences, University of the Free State,
Nelson Mandela Drive, Bloemfontein, South Africa.

May 2021

To the Chief Executive Officer,
Nanyuki County Referral Hospital, Laikipia County, Kenya
P. o Box 66 Nanyuki.

RECEIVED
19 MAY 2021
CHIEF EXECUTIVE OFFICER
COUNTY GOVERNMENT OF LAIKIPIA

Extension Approved
To liaise with the relevant departments
Ag CEO, NTRH

REF: Request for extension of data collection period
Research Tittle: Enabling adult diabetes self-management in the Kenyan context: A design Science Research Approach (Reg. No. 2018725131).

I'm a PhD student at the University of the Free State, South Africa pursuing a doctoral degree in Nursing. I'm glad to inform you that I successfully completed my first phase of data collection at your institution in the course of the year 2020. However, the period allowed for me to collect data as per the attached approvals has lapsed. I therefore request for an extension of the data collection period for a further six months with effect from 1st June 2021 to enable me conduct the second phase of data collection.

In this phase I shall be conducting a survey among the health care providers who provide care to adult diabetic patients at your institution. I will request consenting health care providers to avail to me their contacts for the sole purpose of sending them the electronic survey tools.

Sign
Esther Opisa
0724729453
Email: asenahabiesther@gmail.com

Addendum 3D: Kakamega County Referral Hospital Medical Superidentent

COUNTY GOVERNMENT OF KAKAMEGA

E-mail: wpgh15@yahoo.com
Telephone: Kakamega 0702930346
When replying, please quote:

REF: CGH/KAK/ERC/VOL.I/106

COUNTY GENERAL HOSPITAL
P.O. Box 15-G.P.O-50100
KAKAMEGA

DATE: 30TH JULY 2021

MINISTRY OF HEALTH SERVICES

ESTHER OPISA
LICENCE NO. NACOSTI/P/21/11547

RE: RESEARCH PROPOSAL APPROVAL – NO. ERC/129-08/2021

This is to inform you that **Kakamega County General Hospital Ethics Review Committee (KCGH ERC)** has approved extension of your research proposal titled: ***"Enabling adult diabetes self-management in the Kenyan context: A design Science approach"*** for six months. The approval period is 30th July 2021 – 3rd February 2022. This approval is subject to compliance with the following requirements:

i. Only approved documents including informed consent, study instruments, MTA will be used.
ii. All changes including amendments, deviations and violations are submitted for review and approval by the **KCGH ERC.**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **KCGH ERC** within 24 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety of welfare of the study participants and others or affect the integrity of the research must be reported to **KCGH ERC** within 24 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to **KCGH ERC.**

This approval should be attached to your research license from National Commission for Science, Technology and Innovation (NACOSTI) and also other necessary clearances.

30 JUL 2021

DR. AJEVI AUSTINE
CHAIRMAN
ETHICS AND RESEARCH COMMITTEE
CGH - KAKAMEGA

ADDENDUM 4: INFORMATION LEAFLETS

Addendum 4Ai: Information leaflet for adults diagnosed with diabetes (English version)

Dear client,

I'm a PhD student at the University of Free State, South Africa. I invite you to participate in research study entitled: Enabling diabetes self-management in the Kenyan context: A design science research approach.

Reason for you to participate in the study

Your participation in this study will enable us to determine context specific background factors affecting diabetes self-management among adults in Kenya. This information will greatly help us to design a context specific product that will enable diabetes self-management among adults in Kenya.

Your participation in this study will enable us to identify basic factors that affect self-management among adults diagnosed with diabetes in Kenya. This information will greatly help us to design simple and appropriate ways that adult diabetic patients in Kenya can use to manage themselves.

What is your role in this study?

You will be expected to participate in a group interview using an illustration of a Kawa river model approach. The word Kawa refers to a river. At the beginning of the group interview session, the researcher will demonstrate to you how a Kawa-river model can be drawn. Components of a river like the riverbank (boundaries on the sides), how the river is flowing, rocks at the bottom of the river, and floating pieces of wood or the driftwood will form part of the river you draw. You will be asked to draw a river flowing between its sideway boundaries that are also called riverbanks. Using these sideway boundaries you will demonstrate any factor that could either be enhancing or hindering the river flow in your environment. The river flow will represent your life flow whether it is smooth or rough. Rocks in your river represent obstacles and challenges, driftwood represents influencing

factors and space stands for opportunities for improving river flow. As you draw your river, you will be expected to demonstrate how your life as an adult diagnosed with diabetes has been by using the factors illustrated above. After this all the group members will be involved in discussion session to come up with the basic issues that are affecting diabetes self -management among the group. The information gained will be a group consensus and not your personal views. Details of this discussion session will be tape-recorded so as to be used later during analysis of the findings. The researcher will keep the recorded tapes under very safely to ensure this information does not released to people who are taking part in this study.

When will the group interviews take place?

The group interviews will be conducted on selected day that will be agreed upon between the patients and the research team. This will have to be a most convenient day in your schedule. The interviews will be conducted at the diabetes out-patient department. I will be re-imburse travelling expenses to a maximum of 200 Ksh.

Benefits and risks of participating in the study

There are no monetary gains in this study to the participants. However, as you participate in this study you will be directly be able to realise factors that could be prevent you from achieving self-management and making you have poor health outcome. You will better understand how to care for yourself once an appropriate means of doing so is developed. There is no foreseen physical danger in this study. However, in case some unforeseen psychological effects arise in the course of the study, kindly feel free to inform the researcher or research assistants whose telephone numbers are provided below for you to receive appropriate attention. If you feel like leaving the study at any point kindly notify the researcher.

Information you need to disclose

Your name will not feature anywhere in this study. The researcher will only allow you to use a code. By so doing all the information you give will remain known only the

researcher. All information gathered will be used only for the purpose of this study. Individuals who have no permission will not access this information.

You will be asked to fill in your personal basic details and participate in the group interview and discussion but not your name. The discussion will be tape-recorded to help us in data analysis. This recorded information will be used by the research team only. Once the study is completed, the taped content will be deleted.

Accepting to participate in the study

You will be requested to participate in this study at your own free will. No amount of force will be used against you. Once you accept to willingly participate in the study, you will provide a signed form that shows that you have agreed to take part in the study.

The study findings

The study findings will be used by the researcher to design a diabetes self-management product for adults diagnosed with diabetes in Kenya. The study findings will be published as a way of contributing to field of research in nursing. However, no one will realize that you were a study participant because your personal identification details will not be included.

Study approval

This research has been approved by ethics review body at the University of Free State South Africa and local ethics review bodies like NACOSTI and MKU ethics review board.

Below please see contact information for Mount Kenya Research ethics committee:

Mount Kenya University, General Kago Road, P.oO.Box 342-01000, Thika

Tel: 254672820000

Cell: +254720790796

Email: info@mku.ac.ke

Web: www.mku.ac.ke

Thank you in advance.

Esther Opisa

Mobile phone number: 0724729453

Email: asenahabiesther@gmail.com

Addendum 4Aii: Kipeperushi cha habari kwa watu wazima waliogunduliwa na ugonjwa wa kisukari kushiriki katika mijadala ya kikundi (Swahili version)

Mpendwa mteja,

Mimi ni mwanafunzi wa PhD katika Chuo Kikuu cha Free State, Afrika Kusini. Ninakualika kushiriki katika utafiti unaoitwa: Kuwezesha kujisimamia kwa kisukari katika muktadha wa Kenya: Mbinu ya utafiti wa sayansi ya kubuni.

Sababu ya kushiriki kwenye utafiti huu

Sababu ya wewe kushiriki katika utafiti Kushiriki kwako katika utafiti huu kutatuwezesha kubainisha mambo mahususi ya usuli yanayoathiri kujidhibiti kwa ugonjwa wa kisukari miongoni mwa watu wazima nchini Kenya. Kushiriki kwako katika utafiti huu kutatuwezesha kutambua mambo ya msingi yanayoathiri kujisimamia miongoni mwa watu wazima waliogunduliwa na kisukari nchini Kenya.

Je, jukumu lako ni lipi katika utafiti huu?

Utatarajiwa kushiriki katika mahojiano ya kikundi kwa kutumia kielelezo cha mkabala wa mfano wa mto Kawa. Vipengele vya mto kama ukingo wa mto (mipaka kwenye kando), jinsi mto unavyotiririka, mawe chini ya mto, na vipande vya mbao vinavyoelea au mbao za drift zitakuwa sehemu ya mto unaochora. Mtiririko wa mto utawakilisha mtiririko wa maisha yako ikiwa ni laini au mbaya. Miamba kwenye mto wako inawakilisha vizuizi na changamoto, miti inayoteleza inawakilisha mambo yenye ushawishi na nafasi inawakilisha fursa za kuboresha mtiririko wa mto. Unapochora mto wako, utatarajiwa kuonyesha jinsi maisha yako kama mtu mzima aliyegunduliwa na ugonjwa wa kisukari yamekuwa kwa kutumia mambo yaliyoonyeshwa hapo juu. Baada ya hayo wanakikundi wote watashirikishwa katika kikao cha majadiliano ili kuja na masuala ya msingi ambayo yanaathiri udhibiti wa kisukari miongoni mwa kikundi. Taarifa itakayopatikana itakuwa makubaliano ya kikundi na si maoni yako binafsi. Maelezo ya kipindi hiki cha majadiliano yatarekodiwa kwa mkanda ili yatumike baadaye wakati wa uchambuzi wa matokeo.

Mtafiti ataweka kanda zilizorekodiwa chini kwa usalama sana ili kuhakikisha kuwa taarifa hii haitolewi kwa watu wanaoshiriki katika utafiti huu.

Mahojiano ya kikundi yatafanyika lini?

Mahojiano ya kikundi yatafanyika kwa siku iliyochaguliwa ambayo itakubaliwa kati ya wagonjwa na timu ya utafiti. Hii itabidi iwe siku inayofaa zaidi katika ratiba yako. Mahojiano hayo yatafanyika katika idara ya wagonjwa wa kisukari. Nitalipia tena gharama za usafiri hadi kiwango cha juu cha Ksh 200.

Faida na hatari za kushiriki katika utafitiHakuna faida za kifedha katika utafiti huu kwa washiriki.

Hakuna faida ya kifedha katika utafiti huu kwa washiriki. Hata hivyo, unaposhiriki katika utafiti huu utaweza kutambua moja kwa moja mambo ambayo yanaweza kukuzuia kufikia kujisimamia na kukufanya kuwa na matokeo duni ya kiafya. Utaelewa vizuri jinsi ya kujijali mwenyewe mara tu njia inayofaa ya kufanya hivyo itakapoundwa. Hakuna hatari ya kimwili iliyotabiriwa katika utafiti huu. Hata hivyo, iwapo baadhi ya athari za kisaikolojia zisizotarajiwa zitatokea wakati wa utafiti, tafadhali jisikie huru kumjulisha mtafiti au wasaidizi wa utafiti ambao nambari zao za simu zimetolewa hapa chini ili upate uangalizi unaofaa. Iwapo unahisi kutaka kuacha utafiti wakati wowote tafadhali mjulishe mtafiti.

Taarifa unayohitaji kufichua

Jina lako halitaangaziwa popote katika utafiti huu. Mtafiti atakuruhusu kutumia msimbo pekee. Kwa kufanya hivyo taarifa zote utakazotoa zitabaki kujulikana tu na mtafiti. Taarifa zote zitakazokusanywa zitatumika kwa madhumuni ya utafiti huu pekee. Watu ambao hawana ruhusa hawatafikia maelezo haya. Utaulizwa kujaza maelezo yako ya kimsingi ya kibinafsi na kushiriki katika mahojiano na majadiliano ya kikundi lakini sio jina lako. Majadiliano yatarekodiwa kwa mkanda ili kutusaidia katika uchanganuzi wa data. Taarifa hii iliyorekodiwa itatumiwa na timu ya utafiti pekee. Baada ya utafiti kukamilika, maudhui yaliyorekodiwa yatafutwa.

Kukubali kushiriki katika utafiti

Utaombwa kushiriki katika utafiti huu kwa hiari yako mwenyewe. Utaombwa kushiriki katika utafiti huu kwa hiari yako mwenyewe. Hakuna kiasi cha nguvu kitatumika dhidi yako. Hakuna kiasi cha nguvu kitatumika dhidi yako.

Matokeo ya utafiti

Matokeo ya utafiti yatatumiwa na mtafiti kubuni bidhaa ya kujidhibiti ya kisukari kwa watu wazima waliogunduliwa na kisukari nchini Kenya. Matokeo ya utafiti yatachapishwa kama njia ya kuchangia uwanja wa utafiti katika uuguzi. Hata hivyo, hakuna mtu atakayetambua kuwa ulikuwa mshiriki wa utafiti kwa sababu maelezo yako ya kitambulisho cha kibinafsi hayatajumuishwa.

Idhini ya utafiti

Utafiti huu umeidhinishwa na bodi ya ukaguzi wa maadili katika Chuo Kikuu cha Free State Afrika Kusini na mashirika ya ukaguzi wa maadili kama vile NACOSTI na bodi ya ukaguzi wa maadili ya MKU. Tafadhali tazama maelezo ya mawasiliano ya kamati ya maadili ya Utafiti ya Mlima Kenya hapa chini:

> Chuo Kikuu cha Mount Kenya, barabara ya General Kago, P.O. Box 342-01000, Thika.
>
> Tel: 254672820000
>
> Cell: +254720790796
>
> Email: info@mku.ac.ke
>
> Web: www.mku.ac.ke

Asante

Addendum 4B: Information leaflet for health care providers

Dear colleague

You are invited to take part in this study entitled: Enabling diabetes self-management in the Kenyan context: A Design Science Research Approach. The principle investigator is a PhD student at the University of the Free State, South Africa.

Why should you participate in the study?

As a health care provider who provides crucial services to adults diagnosed with diabetes in Kenya, your contribution in this study will go a long way in ensuring the practicability of a product that will enable DSM among adults in Kenya.

What is your role in this study?

You will be provided with version 3 of the emerging product to give your inputs on its practicability. This will form part of phase 2 of the study, a stage where a lot design synthesis of the product will be taking place. Version 3 of the product will be emailed to you so that you can respond within a period of 3 weeks from the time you receive the document.

Benefits and risks of the study

There is no direct benefit in this study. However, you will be able to improve your knowledge on the practicability of the tools used to enhance DSM among adults in your place of work.

There are no perceived risks in this study.

Information you will disclose

You will be asked to provide your bio demographic data for the sake of data analysis. However, do not include your identification details in the questionnaire. Personal identification Information that should not be indicated on the questionnaire includes your name, telephone number and national identification number. You will choose an anonymous identification code to be used in this study. Once you evaluate the

practicability of version 3 of the product, you will be expected to hand in a written feedback by correspondence.

Acceptance to participate in the study

You are asked to voluntarily participate in this study. If you so agree to participate in this study, kindly go ahead and fill in the information and this will deemed that you have consented to participate in the study. No written consent will be expected from you.

What will happen to your input in the study?

Your input will be used by the researcher to compile the first prototype of the emerging product. These details will then be part of future journal publications as well as conference presentations.

Study approval

This research has been approved by ethics review body at the University of Free State South Africa and local ethics review bodies like NACOSTI and MKU ethics review board.

Thank you in advance.

Signed

Esther Opisa

Mobile phone number: 0724729453

Email: asenahabiesther@gmail.com

Addendum 4C: Information leaflet for diabetes experts

Dear colleague

You are hereby invited to participate in this study entitled: Enabling diabetes self-management in the Kenyan context: A Design Science Research Approach. The principle investigator is a PhD student at the University of The Free State, South Africa.

Aim of the study

The main aim of this study is to design a context specific product that will improve diabetes self-management in Kenya. This will go a long way in reducing diabetes morbidity and mortality in Kenya.

Why should you participate in the study?

I request you to participate in this study as a diabetes expert to assist in evaluating the designed prototype 2 of a context specific DSM product for Kenya. This will ensure that the product is as objective as possible. Your contribution will be of great importance in this research.

What is your role in this study?

You will be expected to evaluate the DSM prototype against the set evaluation criteria that will be provided to you. You are asked to indicate if the prototype is objective and workable in the Kenya context. You will provide the researcher with a written feedback which will be used to design the final product.

Benefits and risks of the study

There is no direct benefit entitled to you from the study. However, you will be included in the authorship of publications that will be derived from phase 3 of this study dealing with evaluation of the DSM prototype in designing DSM product for adults diagnosed with diabetes in Kenya. You may also become conversant the kind of a product that is context specific for this set-up. This will assist you in your duties of caring for diabetic patients.

You will be compensated for the time used in this study at a maximum rate of 500 ksh p/h*40 hrs.

There is perceived risk to you as you engage in this study. In case of any unforeseen risks you are kindly requested to contact the principle investigator whose contact details are provided here.

Information you will disclose

You will be asked to provide your bio demographic data for the sake of data analysis. However, your identification details will not be included in your feedback. You will choose an anonymous identification code to be used in this study. Once you evaluate the provided prototype you will be expected to hand in a written feedback.

Acceptance to participate in the study

You are asked to voluntarily participate in this study. If you so agree to participate in this study, kindly go ahead and fill in the information and this will deemed that you have consented to participate in the study. No written consent will be expected from you.

What will happen to your input in the study?

Your input will be used by the researcher to compile the final DSM product. These details will then be part of future journal publications as well as conference presentations.

Study approval

This research has been approved by ethics review body at the University of Free State South Africa and local ethics review bodies like NACOSTI and MKU ethics review board.

Thank you in advance.

Signed

Esther Opisa

Mobile phone number: 0724729453

Email: asenahabiesther@gmail.com

ADDENDUM 5: INFORMED CONSENTS

Addendum 5Ai: Informed consent for adults diagnosed with diabetes (English version)

I accept voluntarily to participate in the study entitled: Enabling diabetes self-management in the Kenyan context: A Design Science Research Approach. I have read and understood the information provided to me concerning this study.

I consent to participate in the group discussion. I understand that the information given in this study will be handled appropriately without exposing it to people who are not allowed to handle the information. In any case of physical or psychological discomfort I have understood that I can leave the study at any given time. I agree that the information gained from this study will be published and be used in Kenya to improve diabetes management.

_____ _____

Signature Date

_____ _____

Witness signature Date

Addendum 5Aii: Kibali cha kushiriki utafiti kwa njia ya mjadala (swahili version of informed consent)

Mimi nakubali kwa hiari yangu kushiriki utafiti huu unaohusu kubuni njia mwafaka ya kuwasaidia wagonjwa wanaogua ugonjwa wa sukari katika taifa la Kenya kujikimu vyema. Nimesoma na kuelewa ujumbe uliopeanwa kuhusus utafiti huu.

Nakubali kushiriki mjadala katika vikundi. Nimeelewa ya kwamba habari zitakazo tolewa katika mjadali huu zitawekwa vyema pasipo kuzipeana kwa watu wasiohusika na utafiti huu. Pia nimeelewa ya kwamba nikipatwa na madhara yoyote wakati wa kuhusika kwenye utafiti huu naweza kujiondoa wakati wowote. Ninaruhusu habari itakayo afikiwa kwenye utafiti huu kuchapishwa kirasmi kwenye mitandao na kutumika kuboresha jinsi wagonjwa wanaougua ugonjwa wa sukari katika taifa la Kenya.

_____ _____

Sahihi Tarehe

_____ _____

Sahihi ya shaidi Tarehe

Addendum 5B. Informed consent for health care providers

I accept voluntarily to participate in the study entitled: Enabling diabetes self-management in the Kenyan context: A Design Science Research Approach. I have read and understood the information provided to me concerning this study.

I consent to participate in the survey. I understand that the information given in this study will be handled appropriately without exposing it to people who are not allowed to handle the information. In any case of physical or psychological discomfort I have understood that I can leave the study at any given time. I agree that the information gained from this study will be published and be used in Kenya to improve diabetes management.

_____ _____

Signature Date

_____ _____

Witness signature Date

ADDENDUM 6: GROUP DISCUSSIONS OPENING STATEMENT

Good morning /afternoon clients.

Thank you for accepting to participate in this study. Today we will talk about the things that influence how you handle your own diabetes care. We shall do this this by drawing your rivers of life first. You will liken the things we find in the river to things in your life that either help you to take care of yourself or those that hinder your self-care. The things we find in a river include stones that block water from flowing, water which represents your life since you got diabetes, the beginning of the river which stands for the time you were told you have diabetes, the end of the river which will show where your life with diabetes has reached, some animals like fish, crocodiles, snakes. There are other things like sand, trees on the riverbank and in the water, grass on the riverbanks. When drawing your river, you will compare these things to what you may be having in your life as a diabetic patient. include the following things,

I will demonstrate to you my river as a student, then you can learn how to draw your own rivers. After you have completed drawing your rivers, we shall sit down as a group and discuss on those things that help you in your self-care and those that prevent you from taking care of yourselves. Everyone will tell us about the things they have drawn in his/her river.

You are welcome to this session, please feel free to ask any questions about this process.

ADDENDUM 7: DSM PROTOTYPE GUIDE EVALUATION FORM

Introduction

This form is designed to guide identified diabetes experts' evaluation of a Diabetes Self-management (DSM) guide. This is a DSM guide for adult patients diagnosed with diabetes, *to be used both by the patient independently, as well as during structured health communication with health care providers.* Each page of the DSM guide has 2 sections, a top section focusing on the patient and a bottom section indicated as health care provider notes for the health care provider. *This guide can be used in sections and not necessarily working through the whole guide during a single consultation.* It could be used in hard copy format during visits to the health care facility, or electronically on various platforms.

The DSM guide has been developed through a rigorous scientific research process. The scientific research process that was adopted entailed literature review, group discussions among Kenyan adults diagnosed with diabetes and surveys among diabetes health care providers in Kenyan health facilities. Data collected from this research process culminated in a list of 19 Design Requirements (DRs), that were considered in the design of a DSM guide. The 19 DRs are illustrated in section A of this evaluation form. Alongside the 19 DRs, the design of this guide is also informed by the evaluation criteria by Pratt et al (2015). Adoption of Pratt et al evaluation criteria into this DSM guide is summarised in section B of this evaluation form.

The 19 DRs and the evaluation criteria formed the basis for developing the procedure of use, general layout and content of the DSM guide. Identified diabetes experts are asked to indicate their general impression on the procedure of use, general layout and content, of this guide, as stipulated in section C of this evaluation form.

Please familiarise yourself with the DSM guide prior to completing section A to C.

Diabetes expert demographic data

Indicate your response by ticking against the appropriate choice(s)

1.1 Which country are you currently practicing?

Country	**Response**
Kenya	
Uganda	

1.2 What is your work station?

Work station	**Response**
Out-patient diabetes clinic	
Ministry of Health office	
Non-governmental organization	

Any other work station

1.3 How long have you been involved in enhancing diabetes management?

Duration of experience	**Response (Tick against one only)**
1 to 5 years	
6 to 10 years	
More than 10 years	

Section A: Design requirements

What is your opinion on the extent to which the Design Requirements (DRs) are achieved in the DSM guide?

The following is a clarification of the scale used in answering this question.

- Meet requirement fully: The requirement is fully demonstrated in the DSM guide.
- Meet criteria partially: The requirement is demonstrated in the DSM guide to some extent, although not exhaustively.
- Does not meet criteria: The requirement is evidently missing in the DSM guide.

At the end of each requirement a text box is provided**. *If the requirement partially meets the criteria or does not meet the criteria, please suggest in the comment block what adjustments can be made to the DSM guide to fully meet the stated requirement.***

Question: In your opinion, using the scale above, to what extent does the product meet the following requirements?

Indicate your response by ticking in the corresponding column and typing comments in the comment block provided.

1. Requirement	**Meet requirement fully**	**Meet requirement partially**	**Does not meet requirement**
A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to the financial burden of diabetes management.			

Comment

2. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should address challenges associated with food choices, food availability and food security in a practicable and executable manner			

Comment

3. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management among adults in Kenya should be designed to enhance existing and emerging support networks that may include a communication strategy that is not fully dependent on health care providers' input.			

Comment

4. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be sensitive and responsive to challenges such as shortage of staff and lack of self-care resources in this context.			

Comment

5. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should seek to facilitate the identification and management of diabetes-related stress, fears and denial using cultural congruent approaches.			

Comment

6. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should raise awareness, identify, and delay/control the onset and progression of diabetes complications and comorbidities.			

Comment

7. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be designed to support and enhance lifestyle practices that are congruent with DSM recommendations			

Comment

8. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be responsive to physical state/systemic illness, family history of diabetes, socio-economic status, education and age of people diagnosed with diabetes.			

Comment

9. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be responsive to the attitudes of patients diagnosed with diabetes on diabetes and DSM			

Comment

10. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be designed to promote accessible diabetes awareness and education on diabetes management.			

Comment

11. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be responsive to treatment options in this context.			

Comment

12. Requirement	Meets requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be responsive to patients' concerns on self-care resources in this context.			

Comment

13. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should contain an evaluation section for both the product and confidence in owns ability for DSM.			

Comment

14. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should contain information on diabetes related mental illness and or other comorbidities.			

Comment

15. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be designed in a format that will jointly be used by health care providers and patients diagnosed with diabetes.			

Comment

16. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be written using simple terminologies in a language that is appropriate and acceptable to patients with diabetes.			

Comment

17. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should contain instructions on how to use different sections of the product, how to reproduce the product and a cover page with provision of patient's personal details.			

Comment

18. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be designed in a format that the author perceives as most appropriate while allowing room for presentation of some sections in subsidiary formats as it deems necessary.			

Comment

19. Requirement	Meet requirement fully	Meet requirement partially	Does not meet requirement
A product that will enable diabetes self-management by adults in Kenya should be circulated through easily accessible channels including most commonly used social media platforms and mass media.			

Comment

Section B: Evaluation criteria

In this second evaluation section, indicate your opinion on how you evaluate the DSM guide with reference to the provided criteria in the first column. The following is a clarification of the scale used in answering this question.

- Meets criteria fully: The criterion is fully achieved in the diabetes self-management guide
- Meets criteria partially: The criterion is demonstrated in the diabetes self-management guide to some extent, although not exhaustively.
- Does not meet criteria: The criterion is not achieved at all.

At the end of the criterion, extra space is provided. If the criteria are partially achieved or has not been achieved at all, give your suggestion(s) on possible adjustments that can be made on the diabetes self-management guide to fully meet the evaluation criteria.

Indicate your response by ticking in the corresponding column.

Criteria			**Description of the criteria**	**Meets criteria fully**	**Meets criteria partially**	**Does not meet**
1. Goal	a) Efficacy		The DSM guide will most likely enable diabetes self-management			
	b) Validity		The content in the DSM guide is sound.			
	c) Generality		The DSM guide covers the range of topics related to DSM as required.			
2. Environment	a) Consistency with people diagnosed with diabetes	i. Utility	The DSM guide is useful for the self-management of diabetes.			
		ii. Under-standability	The DSM guide is easy to understand by the patient and health care worker.			
		iii. Ethicality	The DSM guide is ethical and morally sound.			

Criteria			Description of the criteria	Meets criteria fully	Meets criteria partially	Does not meet
		iv. Side effects	Use of the DSM guide does not hold any threat of adverse effects.			
	b) Consistency with technology		The DSM guide can be used by utilising available technology. e.g. Computers, printers, cell phones, common software programs and common social media platforms in Kenya.			
3. Structure	a) Completeness		The product enhances diabetes self-management in totality.			
	b) Simplicity		The product is not complicated and can be used and understood in a simple way.			
	c) Clarity		Information in the product is clear, and clearly presented.			
	d) Style		The product appeals to a potential user and is presented with an acceptable level of elegance.			
	e) Hormo-mophisism	i) Correspon-dence with other models	The DSM guide has similar features as other existing diabetes self-management products but does not duplicate the structure of already existing products.			
		ii) Fidelity to modelled phenomena	The product is aligned to the main concepts of diabetes self-management.			
	f) Consistency		The diabetes self-management product displays sufficient uniformity in its structure.			
4. Activity	a) Completeness of activity		The DSM guide enables the full scope of recommended requirements.			

Criteria		Description of the criteria	Meets criteria fully	Meets criteria partially	Does not meet
	b) Consistency of activity	The DSM guide follows the same layout consistently.			
	c) Accuracy	The information presented in the product is correct.			
	d) Performance	People diagnosed with diabetes can use the different sections of the DSM guide with minimal effort			
	e) Efficiency	The DSM guide can be used in a cost-effective and timesaving manner.			
5. Evolution	a) Robustness	The DSM guide seems able to be tested and re-tested over time			
	b) Learning capability	The DSM guide seems able to be improved over time as it is implemented.			

Section C: General evaluation of the diabetes self-management product

In this section, you are requested to give your general impression of procedure of use, content, and the layout of the diabetes self-management guide. Please give your general views, if any, on how the procedure of use, the content and layout of the DSM guide could be improved. Fill in your information in the comment blocks provided.

1. General impression on the proposed way the DSM guide will be used.

2. General impression on the content of the DSM guide.

3. General impression on layout of the DSM guide.

- Thank you for participating in this review -

ADDENDUM 8: PROTOTYPE DSM GUIDE

DIABETES SELF-MANAGEMENT MADE SIMPLE: A step-by-step guide

I MADE IT WITH DIABETES! YOU CAN ALSO MAKE IT.

Name of the user: _____
Age (Years): _____
Home area: _____
Telephone number: _____

USING THE GUIDE TO MANAGE DIABETES:

- Follow the order provided in this guide
- You can use the guide individually, or with your family members, or with other people living with diabetes
- As you use this guide, think of more innovative ways of managing your diabetes
- Seek help from your doctor on any areas of the guide that you are not sure of
- Your doctor will ask you how you are doing with managing your diabetes
- Participate in self-evaluation on your diabetes management once a year

1

WHAT IS DIABETES?

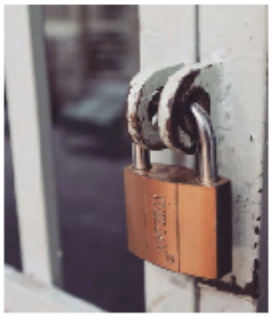
- Diabetes is a health condition that is caused by unhealthy lifestyle.
- An unhealthy lifestyle has a direct effect on your blood sugar.
- If your blood sugar is not what it is supposed to be, then your body becomes sick and lacks energy.

HOW IS BLOOD SUGAR LEVEL CONTROLLED IN YOUR BODY?

- To control blood sugar, your body produces and uses a substance called insulin.
- Insulin works like a **gatekeeper at a workstation.**

The example of insulin as a gate keeper:

- Insulin opens body muscles gates, just as the gate keeper opens a work station gate.
- Blood sugar enters the body muscles just as the workers enter the work station.



- If you have diabetes, your body may lack insulin or fail to use available insulin properly
- This can be likened to the gatekeeper being absent
- Blood sugar will not enter the body muscles just as workers cannot enter a work station
- The body lacks energy, just as no goods are produced in the work station

---

** Notes for the health care provider*

- Ask the person diagnosed with diabetes to tell you what diabetes is.
- Demystify any misconceptions on what diabetes is.

WHAT ARE THE WARNING SIGNS OF DIABETES?

If you experience these signs, visit the nearest hospital

Need to use the toilet frequently

Extreme tiredness

Extreme hunger

Drinking alot of water

Problems with sexual function

Wounds that do not heal

Weight loss

* *Notes for the health care provider*

- Identify any other diabetes-related signs that the patient might present with

HOW IS DIABETES DIAGNOSED?

Your doctor will prick your finger and get some blood to check your blood sugar

WHO CAN SUPPORT YOU IN MANAGING YOUR DIABETES?

1. Your spouse can help with diet management

2. Your friend can help you to exercise

3. Other people diagnosed with diabetes can help you to monitor your blood sugar

4. A family member can help you to take medication at home

5. Spiritual leader can help you to manage stress

6. Workmate can help you with self-care at work

Notes for the health care provider

- Assist the patient diagnosed with diabetes to identify a support network as soon as the diagnosis is made

CHOOSE FOODS THAT ARE:

- Affordable, locally available and fresh
- Energy giving foods that do not increase blood sugar too quickly, such as whole maize, brown bread, millet flour, tubers and roots

Whole Maize

Finger Millet

Casava

Arrow Roots

- Cook food using healthy methods such as **roasting, steaming and boiling**

Roasting

Steaming

Boiling

Meat without a lot of fat

Chicken without skin

A Healthy plate

FOODS AND FOOD HABITS THAT YOU SHOULD AVOID:

Sweetened juices and sweetened tea

Fruits that contain alot of sugar

Expensive commercial diabetic foods

Fried foods

Fried rice and meat (pilau)

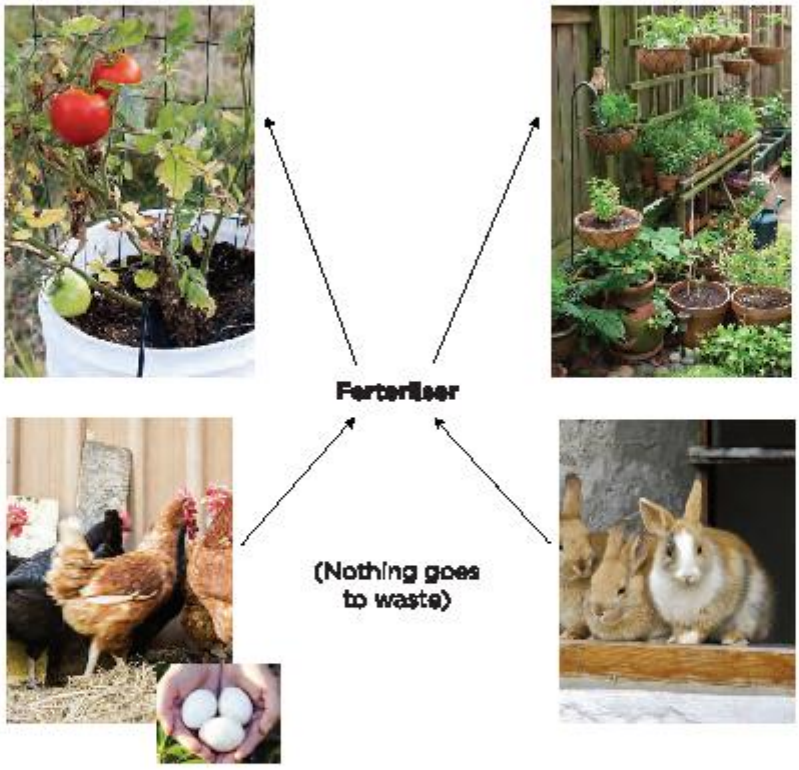
- Traditional eating habits that do not agree with healthy eating habits
- Culturally accepted food that is high in fat, and high in salt
- Feeding habits that do not allow you to take recommended food portions

Notes for the health care provider

- Assess the nutritional status of the patient diagnosed with diabetes
- Assist the patient diagnosed with diabetes to choose healthy foods and use natural flavours to improve the taste of food
- Assist the patient to come up with an individualised meal plan
- Assist the patient to understand how to control food portions for every meal
- Advise the patient diagnosed with diabetes to identify and avoid unhealthy feeding eating habits

FOOD AVAILABILITY:
HOW CAN I MAKE SURE I HAVE AFFORDABLE FOOD AVAILABLE?

- Engage your mind and body in some creative work at home and create a beautiful compound
- Use the small space available to produce healthy food
- You can sell the extra produce to cater for other self care needs
- Irrigate with kitchen waste water



** Notes for the health care provider*

- Identify food security and food availability issues affecting the patient
- Facilitate group discussion amongst patient diagnosed with diabetes on innovative ways to improve food availability and food security
- Encourage the patients diagnosed with diabetes to venture into cost-effective approaches to food production

PHYSICAL ACTIVITY CAN HELP YOU MANAGE YOUR DIABETES

What are the benefits of physical activity?

- It helps you to lose extra weight and lower your blood pressure
- It helps you to reduce stress and improve sleep
- It helps your body to use and reduce blood sugar
- It helps to prevent other medical problems caused by poorly managed diabetes

HOW SHOULD YOU PREPARE FOR PHYSICAL ACTIVITY?

Prepare a physical activity plan that fits in with your daily activities

Buy the best shoes you can afford to wear during physical activity

Prepare a healthy snack and water to take in case your blood sugar goes down during physical activity

Choose physical activities that you enjoy and does not cost you a lot of money

Drink some water before you start planned physical activity

Notes for the health care provider

- Educate the patient diagnosed with diabetes on the benefits of physical activity
- Help the patient diagnosed with diabetes to plan their physical activities
- Educate the person diagnosed with diabetes on how they should prepare for physical activity

WHAT ARE SOME OF THE PHYSICAL ACTIVITIES YOU CAN UNDERTAKE?

My daily activities are part of my physical activity.

Gardening

Sweeping the compound

Bicycle riding

Walking in the company of a friend

Planned physical activities with friends/peers

Chair exercise is a new idea that elderly patients and those with physical limitations can perform

Simple exercises, such as rope skipping

- There are still many other physical activities you can engage in
- Identify your preferred physical activity and make it a lifestyle
- If your body hurts take a rest
- Congratulate yourself for every little achievement attained in your physical activity plan

* *Notes for the health care provider*

- Assist the patient to choose suitable physical activity according to their physical fitness
- Encourage patients diagnosed with diabetes to participate in peer support group physical activities

TAKING MEDICATION CAN HELP YOU MANAGE YOUR DIABETES

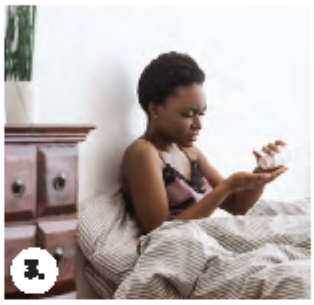
- Diabetes medication can either be in the form of oral or injection

Ideas that can help me to take medication as advised by my doctor

- Identify something that can remind you to take your medication every day
- Do not stop taking your medication even when you feel fine
- The following are examples of medication reminders

Set an alarm clock

Take medication when you eat your meal



Take medication at bedtime

SELF-INJECTION AS PART OF DIABETES SELF-MANAGEMENT

- Your doctor can start you on an injection called insulin if there is need
- Your doctor will teach you how to store, prepare the injection and inject your self

How should you store insulin? The following are important tips on insulin storage

If you have a refrigerator:

- Keep insulin bottles that are not in use on the top shelf of the refrigerator door
- Never keep insulin in the coldest part of the refrigerator
- Do not keep insulin that is already opened in the refrigerator
- Keep insulin that is in use in a plastic container packed with cotton wool in a cool place in the house
- **If you do not have a refrigerator, do not keep extra insulin bottles in the house**

HOW SHOULD YOU PREPARE AN INSULIN INJECTION?

- Your doctor will demonstrate to you the following steps of injecting yourself

Wash your hands

Prepare the medicine and syringe

Put the needle into the medicine bottle and turn it upside down

- Learn how to measure the exact amount of medication that your should take

Notes for the health care provider

- Encourage all patients diagnosed with diabetes to register with the National Hospital Insurance Fund to improve their health care funding
- Ask the patient diagnosed with diabetes to choose a suitable drug reminder
- Ask the patient diagnosed with diabetes to choose an appropriate way of storing insulin
- Teach the patient diagnosed with diabetes how to prepare an insulin injection

HOW SHOULD YOU INJECT YOURSELF?

- First, identify the body part where you will inject
- These are some of the body parts you can inject

On the abdomen

On the thigh

Upper part of the arm

How do I inject myself?

- Make a skin fold in the area where you want to inject
- Inject directly into the skin fold
- Apply a little pressure with a piece of cotton, but do not rub the injected area
- Throw the insulin syringe in a plastic container that has a lid

Can insulin syringe be reused?

- You can reuse the syringe so as to reduce the cost you incur, but under the following guidelines
- Do not reuse more than 5 times
- Cover the needle with its cover before keeping
- Keep the syringe in a clean plastic container that has cotton wool in it
- Cover the container

Truths about insulin injection

- You are not at the last stage of diabetes if your doctor starts you on insulin
- Insulin injection is not very painful, the needle is very small
- You can keep insulin at home even if you do not have a refrigerator
- Insulin does not make you more sick

** Notes for the health care provider*

- Demonstrate to the patient diagnosed with diabetes the possible injection sites
- Demonstrate to the patient diagnosed with diabetes how to rotate the injection sites
- Demonstrate to the patient diagnosed with diabetes how to form the skin fold and inject
- Ask the patient diagnosed with diabetes to return demonstrate the injection sites, how to rotate injection sites, how to form a skin fold and inject
- Identify and demystify any myths about insulin that patients with diabetes have

MONITORING YOUR BLOOD SUGAR CAN HELP YOU MANAGE MY DIABETES

- To monitor your blood sugar you need a blood sugar machine, glucose strips, and a sharp object to prick your finger

How often should you monitor your blood sugar?

If you are injecting yourself I will monitor your blood sugar every day

If you are taking oral drugs and your blood sugar is stable you will monitor my blood sugar twice every month

If you are taking oral drugs but your diabetes is not well managed you will monitor your blood sugar every day

If you are newly diagnosed with diabetes you will check your blood sugar two times in a month

If your diabetes is well controlled, your blood sugar level should be as follows:

- Between 4 to 7 mmols/L before eating
- Between 4 to 9 mmols/L after 1 to 2 hours after you last ate.
- You will always record your blood sugar every time you check

HOW CAN YOU OBTAIN BLOOD SUGAR TESTING MACHINE AND STRIPS AT A LOWER COST?

- Your family can help by saving some money to buy the blood sugar machine and strips
- You can compare prices of different shops and buy from the shop with the lowest price.
- A group of people living with diabetes can poll their money to buy a blood sugar machine and strips
- You can share the machine and strips at support group meetings

Notes for the health care provider

- Demonstrate to the patient diagnosed with diabetes how to measure their blood sugar
- Advise the patient diagnosed with diabetes on how often they should monitor their blood sugar
- Ask the patient diagnosed with diabetes to share with you their records of blood sugar
- Challenge patients diagnosed with diabetes to identify cost-effective ways of acquiring blood sugar meters and strips
- Encourage patients diagnosed with diabetes to acquire blood sugar meters and strips in their peer support groups

SUPPORT FROM OTHER PEOPLE LIVING WITH DIABETES CAN HELP YOU MANAGE YOUR DIABETES

The following are some support group activities:

- Sharing life experiences
- Educating one another on diabetes self-management

Exercising together

Preparing healthy meals together

Checking each other's blood sugar

- Sharing meals and learning about food proportions from each other
- Praying together

Checking body weight

- The list of peer support group activities goes on....
- Identify suitable support group activities that you can engage in

---

*** *Notes for the health care provider***

- Coordinate formation and running of peer support groups
- Encourage patients diagnosed with diabetes to voluntarily join peer support groups
- Assist peer support groups to identify suitable group activities
- Encourage each support group to use social media to establish communication with one another
- Ask peer support group members to identify a link person between the group and the health care provider

STRESS MANAGEMENT CAN HELP YOU MANAGE YOUR DIABETES

How do you know if you are stressed?

- The following are some of the signs of being stressed

Feeling sad

Struggling to sleep

- Lack of appetite
- Lack of interest in favourite activities

Feeling tired for no good reason

Headache

Body aches

How does stress affect your diabetes?

- Stress causes your blood sugar to increase, which makes it more difficult to control your diabetes
- Stress causes other health problems, such as a rise in your blood pressure

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*** Notes for the health care provider**

- Notes to the health care provider
- Assess the level of stress of patients diagnosed with diabetes during clinic visits
- Teach the patient diagnosed with diabetes about the signs of stress
- Facilitate counseling services for patients who are stressed

STRESS MANAGEMENT CAN HELP YOU MANAGE YOUR DIABETES

How do you manage stress?

Spend time with your loved ones

Take a walk in the field

Share your problem with a trusted friend

Take part in religious activities, such as visiting places of worship, reading religious materials, and singing

Take a break and walk away from the problem

Get enough sleep

- There are many more ways of managing stress
- Come up with your own special ways of managing stress

** Notes for the health care provider*

- Encourage the patient to identify unique ways of managing stress

ADDENDUM 9: FINAL DSM GUIDE

DIABETES SELF-MANAGEMENT MADE SIMPLE: A step-by-step guide

I MADE IT WITH DIABETES! YOU CAN ALSO MAKE IT.

Name of the user: _____
Age (Years): _____
Home area: _____
Telephone number: _____

USING THE GUIDE TO MANAGE DIABETES:

- Follow the order provided in this guide
- You can use the guide individually, or with your family members, or with other people living with diabetes
- As you use this guide, think of more innovative ways of managing your diabetes
- Seek help from your doctor on any areas of the guide that you are not sure of
- Your doctor will ask you how you are doing with managing your diabetes
- Participate in self-evaluation on your diabetes management once a year
- Long term learning on how to manage your diabetes is important in improving your blood sugar

WHAT IS DIABETES?

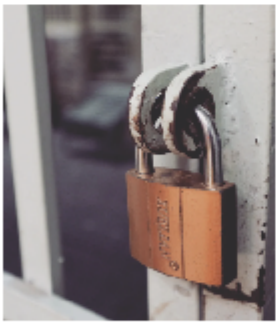
- Diabetes is a health condition that is caused by a lack of insulin in the body or the inability to use available insulin in the body.
- This leads to a high level of sugar in your blood.
- If your blood sugar is not what it is supposed to be, then your body becomes sick and lacks energy.
- Diabetes can run through a family or it can be as a result of lifestyle.

HOW IS BLOOD SUGAR LEVEL CONTROLLED IN YOUR BODY?

- To control blood sugar, your body produces and uses a substance called insulin.
- Insulin works like a **gatekeeper at a workstation.**

The example of insulin as a gatekeeper:

- Insulin opens body muscles gates, just as the gate keeper opens a work station gate.
- Blood sugar enters the body muscles just as the workers enter the work station.



- If you have diabetes, your body may lack insulin or fail to use available insulin properly
- This can be likened to the gatekeeper being absent
- Blood sugar will not enter the body muscles just as workers cannot enter a work station
- The body lacks energy, just as no goods are produced in the work station

Notes for the health care provider

- Ask the person diagnosed with diabetes to tell you what diabetes is.
- Demystify any misconceptions on what diabetes is.

WHAT ARE THE WARNING SIGNS OF DIABETES?

If you experience these signs, visit the nearest hospital

Need to use the toilet frequently

Extreme tiredness

Extreme hunger

Drinking alot of water

Problems with sexual function

Wounds that do not heal

Weight loss

Notes for the health care provider

- Identify any other diabetes-related signs that the patient might present with

HOW IS DIABETES DIAGNOSED?

Your doctor will prick your finger and get some blood to check your blood sugar

WHO CAN SUPPORT YOU IN MANAGING YOUR DIABETES?

1. Your spouse can help with diet management

2. Your friend can help you to exercise

3. Other people diagnosed with diabetes can help you to monitor your blood sugar

4. A family member can help you to take medication at home

5. Spiritual leader can help you to manage stress

6. Workmate can help you with self-care at work

Notes for the health care provider

- Assist the patient diagnosed with diabetes to identify a support network as soon as the diagnosis is made

CHOOSE FOODS THAT ARE:

- Affordable, locally available and fresh
- Energy giving foods that do not increase blood sugar too quickly, such as whole maize, brown bread, millet flour, tubers and roots

Whole Maize

Finger Millet

Casava

Arrow Roots

- Cook food using healthy methods such as **roasting, steaming and boiling**

Roasting

Steaming

Boiling

Meat without a lot of fat

Chicken without skin

A Healthy plate

FOODS AND FOOD HABITS THAT YOU SHOULD BE CAUTIOUS ABOUT:

Replace sweetened tea and juice with water

Take small portions of fruits that are known to quickly raise blood sugar

FOODS AND FOOD HABITS THAT YOU SHOULD AVOID:

Expensive commercial diabetic foods

Fried foods

Fried rice and meat (pilau)

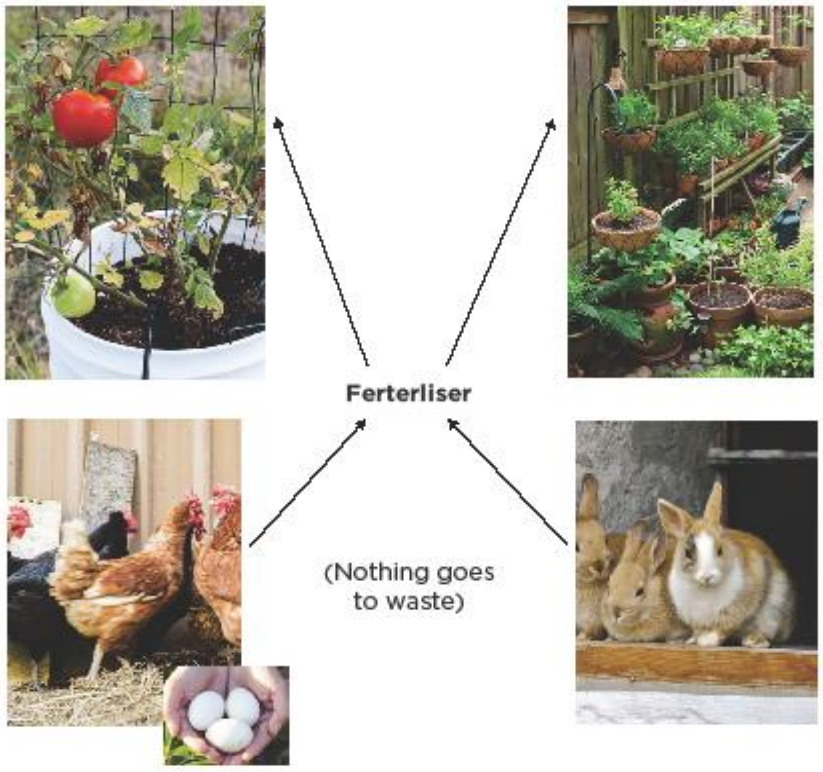
- Traditional eating habits that do not agree with healthy eating habits
- Culturally accepted food that is high in fat, and high in salt
- Feeding habits that do not allow you to take recommended food portions

Notes for the health care provider

- Assess the nutritional status of the patient diagnosed with diabetes
- Assist the patient diagnosed with diabetes to choose healthy foods and use natural flavours to improve the taste of food
- Assist the patient to come up with an individualised meal plan
- Assist the patient to understand how to control food portions for every meal
- Advise the patient diagnosed with diabetes to identify and avoid unhealthy feeding eating habits

FOOD AVAILABILITY:
HOW CAN I MAKE SURE I HAVE AFFORDABLE FOOD AVAILABLE?

- Engage your mind and body in some creative work at home and create a beautiful compound
- Use the small space available to produce healthy food
- You can sell the extra produce to cater for other self care needs
- Irrigate with kitchen waste water



Notes for the health care provider

- Identify food security and food availability issues affecting the patient
- Facilitate group discussion amongst patient diagnosed with diabetes on innovative ways to improve food availability and food security
- Encourage the patients diagnosed with diabetes to venture into cost-effective approaches to food production

PHYSICAL ACTIVITY CAN HELP YOU MANAGE YOUR DIABETES

What are the benefits of physical activity?

- It helps you to lose extra weight and lower your blood pressure
- It helps you to reduce stress and improve sleep
- It helps your body to use and reduce blood sugar
- It helps to prevent other medical problems caused by poorly managed diabetes

HOW SHOULD YOU PREPARE FOR PHYSICAL ACTIVITY?

Prepare a physical activity plan that fits in with your daily activities

Buy the best shoes you can afford to wear during physical activity

Prepare a healthy snack and water to take in case your blood sugar goes down during physical activity

Choose physical activities that you enjoy and does not cost you a lot of money

Drink some water before you start planned physical activity

Check your blood sugar level before you begin exercising

Notes for the health care provider

- Educate the patient diagnosed with diabetes on the benefits of physical activity
- Help the patient diagnosed with diabetes to plan their physical activities
- Educate the person diagnosed with diabetes on how they should prepare for physical activity

WHAT ARE SOME OF THE PHYSICAL ACTIVITIES YOU CAN UNDERTAKE?

My daily activities are part of my physical activity.

Sweeping the compound

Gardening

Bicycle riding

Walking in the company of a friend

Planned physical activities with friends/peers

Chair exercise is a new idea that elderly patients and those with physical limitations can perform

Simple exercises, such as rope skipping

- Exercise for a minimum of 30 minutes for at least 3 days per week.
- Do not skip 2 days without exercising
- There are still many other physical activities you can engage in
- Identify your preferred physical activity and make it a lifestyle
- If your body hurts take a rest
- Congratulate yourself for every little achievement attained in your physical activity plan

Notes for the health care provider

- Assist the patient to choose suitable physical activity according to their physical fitness
- Encourage patients diagnosed with diabetes to participate in peer support group physical activities

TAKING MEDICATION CAN HELP YOU MANAGE YOUR DIABETES

- Diabetes medication can either be in the form of oral or injection

Ideas that can help you to take medication as advised by my doctor

- Identify something that can remind you to take your medication every day
- Do not stop taking your medication even when you feel fine
- The following are examples of medication reminders

Set an alarm clock

Take medication when you eat your meal

Take medication at bedtime

SELF-INJECTION AS PART OF DIABETES SELF-MANAGEMENT

- Your doctor can start you on an injection called insulin if there is need
- Your doctor will teach you how to store, prepare the injection and inject your self

How should you store insulin? The following are important tips on insulin storage

If you have a refrigerator:

- Keep insulin bottles that are not in use on the top shelf of the refrigerator door
- Never keep insulin in the coldest part of the refrigerator
- Do not keep insulin that is already opened in the refrigerator
- Keep insulin that is in use in a plastic container packed with cotton wool in a cool place in the house
- **If you do not have a refrigerator, do not keep extra insulin bottles in the house**

Notes for the health care provider

- Provide detailed information on oral hypoglycemic agents to patients commenced on this treatment

HOW SHOULD YOU PREPARE AN INSULIN INJECTION?

- Your doctor will demonstrate to you the following steps of injecting yourself

Wash your hands

Prepare the medicine and syringe

- Draw air that is equal to the amount of medicine you need to inject yourself into the syringe
- Push the air into the medicine bottle
- Draw the required amount of medicine into the syringe

- Learn to measure the exact amount of medicine that you should take.

Notes for the health care provider

- Encourage all patients diagnosed with diabetes to register with the National Hospital Insurance Fund to improve their health care funding
- Ask the patient diagnosed with diabetes to choose a suitable drug reminder
- Ask the patient diagnosed with diabetes to choose an appropriate way of storing insulin
- Teach the patient diagnosed with diabetes how to prepare an insulin injection

HOW SHOULD YOU INJECT YOURSELF?

- First, identify the body part where you will inject
- These are some of the body parts you can inject

On the abdomen

On the thigh

Upper part of the arm

How do I inject myself?

- Make a skin fold in the area where you want to inject
- Inject directly into the skin fold
- Apply a little pressure with a piece of cotton, but do not rub the injected area
- Throw the insulin syringe in a plastic container that has a lid

Can insulin syringe be reused?

- You can reuse the syringe so as to reduce the cost you incur, but under the following guidelines
- Do not reuse more than 5 times
- Cover the needle with its cover before keeping
- Keep the syringe in a clean plastic container that has cotton wool in it
- Cover the container

Truths about insulin injection

- You are not at the last stage of diabetes if your doctor starts you on insulin
- Insulin injection is not very painful, the needle is very small
- You can keep insulin at home even if you do not have a refrigerator
- Insulin does not make you more sick

Notes for the health care provider

- Demonstrate to the patient diagnosed with diabetes the possible injection sites
- Demonstrate to the patient diagnosed with diabetes how to rotate the injection sites
- Demonstrate to the patient diagnosed with diabetes how to form the skin fold and inject
- Ask the patient diagnosed with diabetes to return demonstrate the injection sites, how to rotate injection sites, how to form a skin fold and inject
- Identify and demystify any myths about insulin that patients with diabetes have

MONITORING YOUR BLOOD SUGAR CAN HELP YOU MANAGE MY DIABETES

- To monitor your blood sugar you need a blood sugar machine, glucose strips, and a sharp object to prick your finger

How often should you monitor your blood sugar?

If you are injecting yourself I will monitor your blood sugar every day

If you are taking oral drugs and your blood sugar is stable you will monitor my blood sugar twice every month

If you are taking oral drugs but your diabetes is not well managed you will monitor your blood sugar every day

If you are newly diagnosed with diabetes you will check your blood sugar two times in a month

If your diabetes is well controlled, your blood sugar level should be as follows:

- Between 4 to 7 mmols/L before eating
- Between 4 to 9 mmols/L after 1 to 2 hours after you last ate.
- You will always record your blood sugar every time you check

HOW CAN YOU OBTAIN BLOOD SUGAR TESTING MACHINE AND STRIPS AT A LOWER COST?

- Your family can help by saving some money to buy the blood sugar machine and strips
- You can compare prices of different shops and buy from the shop with the lowest price.
- A group of people living with diabetes can poll their money to buy a blood sugar machine and strips
- You can share the machine and strips at support group meetings

Notes for the health care provider

- Demonstrate to the patient diagnosed with diabetes how to measure their blood sugar
- Advise the patient diagnosed with diabetes on how often they should monitor their blood sugar
- Ask the patient diagnosed with diabetes to share with you their records of blood sugar
- Challenge patients diagnosed with diabetes to identify cost-effective ways of acquiring blood sugar meters and strips
- Encourage patients diagnosed with diabetes to acquire blood sugar meters and strips in their peer support groups

SUPPORT FROM OTHER PEOPLE LIVING WITH DIABETES CAN HELP YOU MANAGE YOUR DIABETES

The following are some support group activities:

- Sharing life experiences
- Educating one another on diabetes self-management

Exercising together

Preparing healthy meals together

Checking each other's blood sugar

- Sharing meals and learning about food proportions from each other
- Praying together

Checking body weight

- The list of peer support group activities goes on....
- Identify suitable support group activities that you can engage in

Notes for the health care provider

- Coordinate formation and running of peer support groups
- Encourage patients diagnosed with diabetes to voluntarily join peer support groups
- Assist peer support groups to identify suitable group activities
- Encourage each support group to use social media to establish communication with one another
- Ask peer support group members to identify a link person between the group and the health care provider

STRESS MANAGEMENT CAN HELP YOU MANAGE YOUR DIABETES

How do you know if you are stressed?

- The following are some of the signs of being stressed

Feeling sad

Struggling to sleep

- Lack of appetite
- Lack of interest in favourite activities

Feeling tired for no good reason

Headache

Body aches

How does stress affect your diabetes?

- Stress causes your blood sugar to increase, which makes it more difficult to control your diabetes
- Stress causes other health problems, such as a rise in your blood pressure

Notes for the health care provider

- Assess the level of stress of patients diagnosed with diabetes during clinic visits
- Teach the patient diagnosed with diabetes about the signs of stress
- Facilitate counseling services for patients who are stressed
- Refer patients with psychological problems to specialised mental health care providers

STRESS MANAGEMENT CAN HELP YOU MANAGE YOUR DIABETES

How do you manage stress?

Spend time with your loved ones

Take a walk in the field

Share your problem with a trusted friend

Take part in religious activities, such as visiting places of worship, reading religious materials, and singing

Take a break and walk away from the problem

Get enough sleep

- There are many more ways of managing stress
- Come up with your own special ways of managing stress

Notes for the health care provider

- Encourage the patient to identify unique ways of managing stress
- All patients diagnosed with diabetes and are confirmed to be depressed should be treated with antidepressants and cognitive behavior therapy'

ADDENDUM 10: DISTAL VARIABLES DATA EXTRACTION TABLE

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
Mariye, T., Hagos, T., Girmay, T., Hadgu, G. & Workinesh, D. (2018) 'Magnitude of diabetes self-care practice and associated factors among type two adult diabetic patients following at public Hospitals in central zone , Tigray Region , Ethiopia, 2017'. *BMC Research Notes*, 11(380), pp. 1–6. https://doi.org/10.1186/s13104-018-3489-0 (Record 87(587) Summary A survey conducted among adult diabetes patients in public hospitals in Central Zone Ethiopia. Aim: To assess magnitude of self-care practice and associated factors. Questionnaire translated from English to native language of Tigrigna.	(1b) Values, norms and cultural beliefs Socio-cultural variation (1c) Lifestyle Lifestyle differences (1c) Lifestyle Change lifestyle to promote good self-care practice	(2f) Family history) 91 (32%) of total respondents had a family history of diabetes. (2b) Gender Sex variables showed an overall significant effect on good self-care practice. (2d) Socio-economic status Those who were self-employed were 5.936 times more associated with good self-care practice than those who were unemployed. (2d) Employment Those who recruited as self-employed had significant association without income	(3a) Attitude towards diabetes or DSM Positive attitudes to perceived barriers had asignificant association with good self-care practice. (3a) attitudes towards diabetes or DSM Favourable attitudes to perceived benefits had significant association with outcome variable of good self-care practice (3a) Attitudes towards diabetes or DSM Having positive beliefs about expected benefts were found to be an essential factor in doing a special health	(4) Emotion Emotional well-being associated with self-employment.	(5b) Perceived benefits/enabler Having positive beliefs about expected benefits were an essential factor in doing a special health behaviour self-care practice activity		(7d) Self-care resources 44 (15.5%) of respondents had a glucometer at home. (7e) Diabetic education 98 respondents (9.9%) attended diabetes education. (7b) Peer support 34.5% were member of diabetic association. (7b) Peer support 34.5% were did not know about the Ethiopian diabetes association. (7d) Self-care resources Having glucometer at home was significantly associated with

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
		variable good self-care practice.	behaviour self-care practice activity. (3a) Attitudes towards diabetes Unfavourable attitudes toward the disease lead to poor adherence to self-care activity.				good self-care practice. Having a glucometer at home were 3.7 times more associated with good self-care practice than not having a glucometer at home. (7e) Self-awareness Knowing glucose level was significantly associated with good self-care practice. (7e) Diabetes education, awareness and health promotion Attending diabetes education was significantly associated with good self-care practice. (7e) Diabetes education, awareness and health promotion

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							People who usually receive education, from health care professionals were almost three times more likely to engage in good self-care practice than those who did not usually receive education from health professionals. (7d) Self-care resources Inadequate access to glucose monitoring machines, test strips. (7d) Self-care resources Having glucometer at home might encourage patients to measure and to control their blood glucose levels regularly. (7e) Diabetes education,

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							awareness and health promotion Self-awareness encourages diabetic patients to apply the recommended action to do self-care practice. (7e) Diabetes education, awareness and health promotion Education stimulates the individual's performance of diabetes self-care. (7e) Diabetes education, awareness and health promotion Health care personnel and Ethiopian diabetes association must increase patient awareness about the importance of self-care practice domains and strongly promote DSM among

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							diabetes patients.
Mohandas, A., Bhasin, S. K., Upadhyay, M. & Madhu, S.V. (2018) 'Diabetes self care activities among adults 20 years and above residing in a resettlement colony in East Delhi'. *Indian Journal of Public Health*, 62(2), pp. 103–110. https://doi.org/10.4103/ijph.IJPH (Record 265) Summary Study methodology: Cross-sectional study, conducted in a resettlement colony in East Delhi. Study population: Adults at leat 20 years old. Data collection tools: Revised version of summary of diabetes self-care activities(SDACA), translated to Hindi.	(1a) Religion 86.9% Hindu (1c) Lifestyle 13.6% of patients reported having smoked at least once in previous 1 week. Of these, six patients reported to be smoking >20 cigarettes per day. (1c) Lifestyle There was a statistically significant association between smoking status and gender, marital and occupation status. Smoking status was found to be higher in men, in those who were married and those who were employed than in unmarried women/widows	(2a) Age 35.1% of diabetic patients were in the age group of 60–69 years. (2b) Gender 52.4% were female. (2c) Education 41.7% illiterate. (2d) Socio-economic status 23.2% of patients were classified as living below poverty line. (2g) Physical state/systemic illness Two most common complications were eye problems (111, 66.1%) and feet problems (110, 65.5%). 42.3% patients also had hypertension, 17 (10.1%)		(4a) Mental illness comorbidities Depression was present in 43.2% of the study participants. (4b) Emotional influences Participants were apprehensive about needle prick. (4b) Emotional influences About 13.6% patients reported having smoked at least once in previous 1 week. There was a strong possibility that patients hid their smoking status, which may be a reason for the low prevalence of smoking found. (4b) Emotional influences			(7c) Family support 152 (90.5%) received family support in domains of self-care in which they needed help. (7f) Performing recommended self-care practices 30.9% of the study participants had a maximum score of 7 for general diet and only 1.8% for a specific diet. 25% of patients did not practice general diet self-care for even 1 day in the previous week. Only 9% of the study participants had undertaken physical activity on all 7 days in of the last 1 week.

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	and unemployed, respectively (P <0.05). (1c) Lifestyle Most families followed a twice-a-day meal schedule. Adding 2–3 extra meals for diabetic patients was considered a difficult cultural choice to make. In some families, “desi ghee” (saturated fat) was culturally preferred over polyunsaturated or mono-unsaturated fats. (1C) Lifestyle Male diabetic patients gave lack of time as the main reason for not exercising. (1c) Lifestyle Many study participants indicated that their diet depended on	tuberculosis and 8.3% hypothyroidism, which were categorised as “systemic illness. (2d) Socio-economic status Almost 57% of patients depended on own funds for treatment. (2) Socio-demographic factors No significant variable found on univariate analysis of specific diet self-care with socio-demographic factors. (2d) Socio-economic status There was a statistically significant association between exercise score and income of diabetic patients.		Many younger diabetics had a fear of debilitating long-term complications, which made them responsible for carrying out blood sugar testing to prevent complications.			39.3% of the study participants did not practice physical activity for even a single day. 155 patients (92.3%) did not do blood sugar testing at all in the last 1 week. Of the remaining 13 (7.7%) patients, 5 (3%) tested their blood sugar for 3 days while eight (4.7%) patients did so for 1 or 2 days only. 80.4% of the participants did not practice foot care for even a single day in the past 1 week. Maximum foot care score of 7 was present in only 19% respondents. (7c) Family support General diet score of diabetic patients who received family

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	meals cooked in the family. (1b) Values, norms and cultural beliefs Misconceptions/ myths were widely prevalent among participants, which may have led to poor foot-care practices. Many patients believed that soaking feet in water would reduce their blood sugar; they did not inspect their feet or shoes properly. (1c) Lifestyle Few participatns wore footwear inside the house.	Exercise score among study participants who were below the poverty line was much higher (i.e., they had better self-care activities for physical activity) than those diabetic patients who were above poverty line (P=0.029). (2a) Age Patients who were younger (≤50 years) were more likely to do blood sugar testing than those who were ≥50 years (P=0.005). (2d) Socio-economic status The prohibitive cost of seasonal fruits and vegetables may have resulted in a poor intake of these food items by some patients.					support was much higher than those who lacked family support. (7g) Treatment modalities Those who were treated with insulin were more likely to do blood sugar testing than those on treatment with oral hypo-glycemic agents (P=0.008). (7e) Diabetes education, awareness and health promotion Foot care score was significantly better in those who had received advice about the complications and about the foot care practices to be followed (P<0.001) than those who were not aware of foot care.

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		(2e) Marital status Women in Nand Nagri were generally shy about exercising alone, or their husbands did not permit them to go out for exercise. (2d) Socio-economic status Many patients reported poverty as the main reason they could not afford a glucometer and strips for self-monitoring. (2d) Socio-economic status Dependence on own funds and being diagnosed at a private hospital negatively affected general diet self-care by diabetic patients. Thus, if patients had to use their own funds for treatment, they generally found it					Some participants lacked training in self-injection. (7f) Performing recommended self-care practice Blood sugar testing was the most deficient self-care activity among diabetic patients in this study. Foot care practices were also lacking grossly among the study participants. (7c) Family support The absence of family support had a negative effect on self-care activity for general diet. It is well known that family members can interfere with or facilitate self-care activities (e.g., by buying groceries) and thereby

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		difficult to purchase recommended food items for good dietary practices, e.g. fruits and vegetables, which were sometimes expensive. It was observed that physicians in private practice and in private hospitals lay more emphasis on curative than on preventive aspects of management. This might be a reason for the reduced general diet self-care practices observed in study participants (2d) Socio-economic status Some patients below living the poverty line were involved in manual labor (nearly 20%). The physical					contributing to diabetes control among patients. (7e) Diabetic education, awareness and health promotion Diabetic patients who were put on insulin in our study were generally more aware of the need to carry out blood sugar testing because of advice received from doctors while they were taught self-injections with insulin. (7e) Diabetes education, awareness and health promotion Diabetic patients who received advice regarding foot care and complications were found to have better foot self-care practices. General awareness of

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
		activity involved in the work may account for this relationship.					recommended foot care practices and complications was very low. (7e) Diabetes education, awareness and health promotion There is a need for ongoing self-management education programmes in all hospitals, for patients and caregivers. Peripheral-level health functionaries should conduct regular information, education, and communication activities and one-to-one counselling sessions for diabetic patients.
Gurmu, Y., Gela, D. & Aga, F. (2018) 'Factors associated with self-care practice among adult diabetes patients in West Shoa Zone, Oromia Regional State, Ethiopia',	(1a) Religion Orthodox Christians (n=139, 54.1%).	(2a) Age 46.7% were in the age group of 40–59 years. (2b) Gender	(3c) Self efficacy/ attitude towards self Blood glucose testing had strong positive				(7d) Self-care resources Vast majority (n=199, 77.4%) had no gluco-meter at home.

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BMC Health Services Research, 18(732), pp. 1–9. https://doi.org/10.1186/s12913-018-3448-4. (Record 412) <u>Summary</u> Study design: Cross-sectional study. Study area: Four public hospitals located in West Shoa Zone, Ethiopia. Data collection instruments: - Interviewer-administered questionnairre, translated into two local languages. - Summary of Diabetes Self-care Activities (SDSCA) - Revised Brief Diabetes Knowledge Test - The Diabetes Empowerment Scale – Short Form - Brief Scale for Social Support		The majority of the participants were male (n=139, 54.1%). <u>(2e) Marital status</u> Married (n = 173, 67.3%). <u>(2h) Duration of illness</u> Most participants had lived with the disease for more than 10 years (n=90, 35%). <u>(2a) Age</u> Participants in the age group 40 –59 years had 6.35 times higher self-care practice compared to those who were 20–39 years old. <u>(2e) Marital status</u> Married participants had 3.4 times higher self-care practices than single participants in the simple logistic	correlation with self-efficacy.				<u>(7f) Performance of recommended self-care practice</u> Blood glucose testing had the lowest self-care practice mean score across the range, while foot care and medication taking had the highest mean scores. <u>(7e) Diabetes education, awareness and health promotion</u> Compared to participants who had less diabetes knowledge, those who possessed better knowledge had 4.04 times higher self-care practices. <u>(7c) Family/social support</u> Compared to participants who had less social support, those who got better social support had 3.78 times

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		regression analysis (COR=3.40, 95% CI=1.82, 6.34). (2c) Education Compared to participants who did not read and write, those who had attended secondary school had 3.37 times (COR=3.37, 95% CI=1.42, 8.01) and those who attended above secondary school had 3.30 (COR=3.30, 95% CI=1.44, 7.52) higher self-care practice. (2h) Duration of illness Compared to participants who had lived with diabetes for less than 5 years, those who lived with the disease for more than 10 years had 5.64 times higher self-care practice (COR=2.91, 95% CI=2.91, 10.93).					higher self-care practices. (7f) Performing recommended self-care practices Diabetes knowledge, self-efficacy, and social support are important correlates and predictors of self-care practice. (7d) Self-care resources The majority of the participants (77.4%) lacked access to gluco-meter which might have contributed to the identified low practice of blood glucose self-monitoring. (7g) Treatment modalities We did not measure HbA1c due to inadequate financial support to cover the cost; neither was it

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		(2c and h) Education and duration of illness Participants with secondary school education and those who had lived with diabetes for more than 10 years had good self-care practices.					available in the patients' clinical records. (7e) Diabetic education, awareness and health promotion Interventions involving education about diabetes, strengthening support system, and empower-ment for self-care, are warranted.
Bhandari, B. & Kim, M. (2016) 'Self-care behaviors of Nepalese adults with Type 2 diabetes'. *Nursing Research*, 65(3), pp. 202–214. https://doi.org/10.1097/NNR.0000000000000153 (Record 278 (778) SUMMARY Aim: To describe diabetes self-care, perceived social support, diabetes management self-efficacy (DMSE) and ERA, to develop an explanatory model for self-care.	(1c) Lifestyle Participants tried to find normalcy by incorporating disease and required self-care as a part of their everyday lives. (1c) Lifestyle Fulfilling responsibilities toward family and successfully enacting family roles brought mental peace and motivated	(2a) Age The age of the participants ranged from 40 to 88 years, the mean age was 56.9 years. (2h) Duration of illness The mean duration was 8.7 years. (2d) Socio-economic status Economic burden featured significantly in	(3a) Attitude towards diabetes or DSM Diabetes self-care was reported as something that causes "difficulties in everyday living" and was something that "restricted you and limited your freedom". This study substantiates the importance of self-efficacy for	(4b) Emotional influences Participants said they had greater trust in medicine than other diabetes management approaches. Even though there was a tendency to equate self-care behaviour mainly with diet control, there was a pattern of greater trust in	(5a) perceived risk/barriers/challenges There were exceptions in viewing responsibilities toward family solely as booster to adherence to self-care. Some participants had ambivalent attitudes and viewed their roles and responsibilities as barrier for		(7f) Performing recommended self-care practices The most frequently performed diabetes self-care was medication taking. Self-monitoring of blood glucose level was the least performed behaviour. (7c) Family/social support

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Study design: Mixed methods study. Study area: Nepal. Data collection instruments: Survey questionnaires and qualitative interviews.	them to practice better self-care. Responsibility to provide for the family, especially for children, by working (job) or doing housework motivated them to “be in good health.” Specific to Nepalese culture, respondents said that they had unmarried children, and they should practice better self-care and be strong “for them”. Responsibilities also related to caring for older adults in the family, which boosted them positively. <u>(1a) Religion/religious practices</u> Believing that God would cure them was the second theme related to	the participant experience. Participants said that living with diabetes was very expensive, which required them to make adjustments in many things or to give up certain options. <u>(2g) Physical state/systemic illness</u> Restraint due to physical and psychological symptoms was also reported. Fatigue, weight loss, internal weakness, and erectile dysfunction were some of the physical symptoms that acted as barriers to self-care and caused further mental stress, feelings of inadequacy, and anxiety.	diabetes self-care.	prescribed medicines. Although dietary control and exercises such as walking were reported to cause inner struggle and were a means to feel “better,” participants believed that, ultimately, it was the medicine prescribed by the doctors that would control their blood glucose. <u>(4b) Emotional influences</u> Participants tried to find normalcy by incorporating the disease and required self-care as a part of their everyday lives. This was done by using coping strategies such as positive thinking and self-encouragement.	self-care in terms of time and money constraints:		Perceived social support was significantly lower for women. <u>(7C) Family/ social support</u> Differences in perceived social support were based on gender, education level, and working status. Male gender and having a college education or higher was associated with higher levels of perceived social support. <u>(7f) Performing recommended self-care practices</u> Diet control was the most commonly reported self-care behaviour. Participants mostly avoided high-carbo-hydrate food sources such as

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	boosters for self-care. God as the ultimate strength was described by most of the participants. Religious activities, mainly focused on external activities rather than inner spirituality, were ways in which this belief was demonstrated. Doing *puja* (worship), listening to devotional songs or chanting *stothra* (devotional choruses), and visiting *dhams* (religious places) were some of the activities that were reported. Irrespective of differences in religion, God as supreme being was acknowledged by all participants; they believed God had the	<u>(2d) Socio-economic status</u> Constraints due to nature of work were important. Work-related factors caused tension between striving to follow prescribed self-care behaviours and trying to meet the demands of work. Work demands were given priority and adjustments made to the self-care practices. <u>(2d) Socio-economic status</u> Being employed was associated with better self-care. Also, being employed positively promoted self-efficacy, thus indirectly influencing diabetes self-care.		<u>(4b) Emotional influences</u> Even though family was viewed as a source of support and strength, the control imposed by family, mainly in the area of dietary restriction, was looked upon negatively (i.e., depriving their bodies of essential nutrients). <u>(4b) Emotional influences</u> Emotional influences involved mainly internal processes such as positive thinking, self-encouragement, self-control, etc. <u>(4b) Emotional influences</u> Although social support was perceived as either a booster or barrier for practicing self-			potatoes, rice, and sweets. Eating wholewheat bread instead of rice, consuming green leafy vegetables in large quantities, and limiting the intake of fatty foods were other ways by which they adhered to a recommended diet. However, doing so involved difficulties and struggles. Social gatherings was an area where most participants struggled to maintain a balance between following the recommended dietary plan and being embarrassed. Also, there was a constant struggle between desire to “eat more” because the “stomach was always empty”

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	power to help them with the disease: (1c) Lifestyle Thematic analysis revealed that one of the strategies used for diabetes self-care was finding normalcy by integrating the disease and required self-care as a part of their everyday lives. This was mainly done through internal processes such as positive thinking, self-encouragement, self-control, etc. (1a) Religion/ religious practices Belief in God was a motivating factor for self-care behavior, and this led to participation in religious activities (see above).	However, as illuminated by thematic analysis, nature of work could be a barrier for self-care, mainly in areas of dietary regulations and exercise. Work demands were given priority over self-care. It is imperative for nurses to consider the working status and the type of job while planning care for patients with diabetes. (2h) Duration of illness Diabetes duration had only an indirect influence on diabetes self-care through diabetes self-efficacy, meaning patients became more self-efficacious over the years, which		care, the actual momentum to exert control over their disease was derived internally. (4b) Emotional influences Psychosocial interventions to promote DMSE may benefit Nepalese adults with diabetes; however, selection of individualised versus group-based interventions must be tailored for each patient.			and sticking to what was advised. This struggle was mostly reported by female participants. (7b) Peer support Cultivating networks for self-support was a frequently observed pattern seen among middle-aged participants. Networks provided them with a sense of hope, so that they did not feel alone. Morning walks, especially to religious temples, were the most commonly reported time where networks were built. The participants described the benefit of walking in terms of physical benefit and opportunity to socialise with

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	However, the quantitative analysis found no significant correlation between study variables and religion. In Nepalese context, this highlights the need for nurses to be aware of common religious ceremonies/ activities in Nepal, and to tailor DM education based on requirements for religious festivals. <u>(1a) Religion/ religious practices</u> Furthermore, in Nepalese context, this highlights the need for nurses to be aware of common religious ceremonies/activities practiced in Nepal and tailor DM education	positively facilitated diabetes self-care. Because diabetes duration influenced self-care through diabetes self-efficacy, it can be implied that promoting self-efficacy among patients newly diagnosed with diabetes will facilitate better self-care. <u>(2a) Age</u> DMSE was the lowest in the 40–50 years age group, which could have been due to social and familial roles and responsibilities.					"like" people by whom they felt motivated. <u>(7f) Performing recommended self-care practice</u> Despite perceiving diabetes as an economically burdening disease, medication-taking was still the most practiced self-care activity. This could be due to the influence of Nepalese culture, where physicians are looked upon as figures of trust and respect. <u>(7e) Diabetes education, awareness and health promotion</u> Education had both direct and indirect (through perceived social support) effects on diabetes self-care.

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	based on requirements for these religious festivals.						<u>(7e) Diabetes education, awareness and health promotion</u> Diabetes education must be tailored on a patient's education level. Education materials on self-care must be designed so that, irrespective of the literacy level, the information can be disseminated clearly, for instance, using pictures and diagrams. <u>(7c) Family/social support</u> Perceived social support directly influenced diabetes self-care, and indirectly through diabetes self-efficacy. Consistent with previously reported findings (Chlebowy et al., 2010), this study

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							found that social support played an important role in the lives of adults with diabetes. <u>(7b) Peer support groups/peer interventions</u> Being connected to a network had a beneficial effect on adhering to diabetes self-care. The qualitative component highlighted that middle-aged women had a need to feel connected to a network of people with diabetes, which acted as a booster for their self-care. <u>(7C) Family/ social support</u> Lack of support from spouses was a barrier for self-care by women.

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							(7c) Family/ social support Assessing unmet needs for social support, which is the difference between perceived social support needs and the amount of social support actually received, might contribute in planning interventions that are sensitive to gender and literacy status. (7b) Peer support groups/peer interventions Nurses need to act as facilitators to develop formal and informal support groups and networks among diabetes patients, which currently is lacking in Nepal. (7e) Diabetes education, awareness and health promotion DMSE was lowest in the 40–

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							50 year age group. Significant differences in DMSE was seen based on age, educational level (lowest DMSE was seen among illiterate people), working status (lowest among unemployed people), treatment type (lower in the group taking oral hypoglycemic agents only), time since diabetes diagnosis (longer since diabetes diagnosis was associated with better DMSE), and hemoglobin A1c status (higher HbA1c was associated with lower DMSE). DMSE had the strongest influence on diabetes self-care (b*=.42, p<.001).

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							<u>(7e) Diabetes education, awareness and health promotion</u> In the Nepalese context, nurses need to be aware of common religious ceremonies/ activities practiced in the country, and they must tailor diabetes education according to requirements of these religious festivals. <u>(7f) Performing recommended self-care practices</u> This study identifies the importance of incorporating self-efficacy and perceived social support in planning interventions for adults with diabetes; the interventions must be tailored according to

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							gender and literacy status of patients. Involvement of family members in care must be done with caution as participants had ambivalent attitudes about family. The qualitative component indicated that religious activities, belief in God, and network of friends acted as boosters for self-care; hence, it can be deduced that both individual and group-based, tailored psychosocial interventions to promote self-care may benefit Nepalese adults with diabetes.
Wabe, N.T., Angamo, M. M.T. & Hussein S. (2011) 'Medication adherence in diabetes mellitus and self management practices among Type-2 diabetics in	(1c) Lifestyle In total 194 (56%) patients use at least a daily medication reminder (DMR)	(2b) Gender The majority 51.83% were men, and		(4b) Emotional influences In this study, only 6.5% of the patients who missed their	(5a) Perceived barriers The most common reasons given for missing medications were		(7g) Treatment modalities Oral hypo-glycemic agents were prescribed for 351 (91.4%)

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Ethiopia'. *North American Journal of Medical Sciences*, 3(9), pp. 5–10. https://doi.org/10.4297/najms.2011.3418 Summary Aim: To assess adherence to antidiabetic drug therapy and self-management practice among Type-2 diabetic patients in Ethiopia. Study design: Review of case notes and cross-sectional interviews Study area: Jima University Specialized Hospital. Data collection instruments: Data collection forms and questionnairres.	to take their prescribed antidiabetic medication and, of these, 62% were adherent, while 38% were non-adherent. Using DMR and not missing dose has significant association p<0.002. The most commonly used DMRs were mealtimes (86.65%), bedtimes (12.63%) and other, such as using an alarm clock (1.72%). (1c) Lifestyle About 56% of patients use DMRs to remind them to take their prescribed medication. Mealtime and bedtime were the most frequently DMRs used. This finding shows the patients' personal dally	48.17% were women. (2a) Age The mean age was 48.3 years. (2g) Physical state/systemic illness The most frequent comorbidity was hypertension (61.2%), followed by obesity (10.8%), chronic renal failure (6%), coronary heart disease (5.3%), dyslipidemia (3.1%), and other disease ssuch as TB, anemia, osteoarthritis, asthma and hyperthyroidism, with individual frequency of less than 3% all constituted 13.62% of the total co-morbid disease. (2g) Physical state/systemic illness		medication claimed to have disclosed this to health care providers during consultation. The main factor cited for non-disclosure were short consultation time and lack of privacy, resulting in inadequate physician–patient interaction during consultations. This situation may arise due to shortage of health professionals, high patient load, high workload and poor work environments for health care providers in Ethiopia.	forgetfullness 107 (50.2%), being busy 34 (16%), and others, including side effects of drugs, disappearance of the symptoms and perceived inefficacy of the prescribed antidiabetic drugs 72 (33.8%). (5a) Perceived risks/barriers/ challenges The factors identified by patients as underpinning lack of adherence were lack of money (152; 37.1%), side effects of the drugs (119; 29.2%), multiple drug therapies (75; 18.3%), perceived inefficacy of prescribed antidiabetic drugs, leading to concomitant self-medication with		of patients while insulin and OHA was prescribed in 33 (8.6%) of the cases. Of the patients on OHA, 312 (88.9%) where on monotherapy while 39 (11.1%) where on combination therapy. The most frequently prescribed combination therapy contained giybenclamide and metformin (33; 84.6%). followed by tolbutamied and metformin (6 ; 15.4%). Of the patient on mono therapy with OHA 232(74.3%) were on Glibneclamide followed by metformin (80; 25.7%). 161 (41.9%) of the patients had adequate glycemic control.

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	routinea play a great role in maximising adherence to prescribed medications. Therefore, careful identification of patient-specific routine, and using it in planning patient medication regimes by physicians during prescribing and counseling and during dispensing by pharmacists should be the part of the diabetes care process.	Only 90 (26%) of the patients could correctly state the desired blood glucose target; this knowledge was significantly better among patients who claimed to have excellent and very good adherence (170; 48.9%) with to prescribed antidiabetic drugs (P<0.003). 122 (35.1%) of patients had knowledge of possible complications that could arise from poor control of blood glucose. It was significantly better among patients who were missed (178; 51.3%) their antidiabetic medication dose. <u>(2g) Physical state/systemic illness</u>			traditional medicine (40; 9.8%) and lack of access to drugs (23; 5.6%).		Glycosylated hemoglobin tests were not employed for assessment and monitoring purposes. Fasting plasma glucose level was frequently used. <u>(7f) Performing recommended self-care practices</u> On the basis of self-reports regarding their antidiabetic drug adherence, 72 (20.8 %) of the patients claimed that they had anexcellent tendency to take medication with the agreed recommendation of heath care providers, 98 (28.2%) were very good, 117 (33.7%) were good, and 60 (17.3%) said they had poor adherence.

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		Hypertension (61.2%) and obesity (10.8%) were the most frequent comorbidities among the patients studied. <u>(2d) Socio-economic status</u> In this study the main external challenge facing adherence was financial (37.1%). Ethiopia is a resource-limited setting, were the majority of the people are estimated to live below the poverty line, so access to anti diabetic medication appeared restricted by the average monthly cost of 32.7 birr ($2.0). This does not include the cost of other, adjunctive therapy such as anti-hypertensive					In self-reports about the pattern of drug use, 178 (51.3%) of patients said that they had never missed (neither daily dose nor time of taking) a dose, 127 (36.6%) sometimes missed either a daily dose or time of taking, and 42 (12.1%) missed either dally dose or time of taking. <u>(7e) Diabetic education, awareness and health promotion</u> 118(34.1%) of patients had information about the side effects of drugs. When asked about measures they had taken to avoid the side effects, 102 (86.4)% responded that they did nothing, 12 (10.2%) sometimes

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		drugs required by the majority of patients..					omitted a dose and only 4 (3.4%) of them informed health professionals. (7f) Performing recommended self-care practices 9 (2.6%) of patients regularly measured their blood glucose levels at home. (7e) Diabetes education, awareness and health promotion Only 90 (26%) of patients could correctly state the desired blood glucose target. Knowledge of the desired blood glucose target was significantly better among patients who claimed to have excellent and very good adherence 170 (48.9%) with the prescribed anti

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							diabetic drugs (P<0.003). 122 (35.1%) of patients had knowledge of possible complications that could arise from poor control of blood glucose levels. This knowledge was significantly better among patients who were never missed (178; 51.3%) taking their antidiabetic medication. <u>(7g) Treatment modalities</u> The majority of patients were on mon therapy, mainly with either glibenclamide (74.3%) or metformin (25.7%), which is not consistent with recommended intensive control of blood glucose levels.

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							<u>(7g) Treatment modalities</u> The study found that only 41.8% of patients had adequate glycemic control. HbA1c test was not used to monitor or assess glycemic control in any of the patients, only FPG levels were used to assess and monitor glycemic control. However, HbAIc is the established gold standard. This study finding suggests that monitoring of glycemic control at the study site should be improved Findings, therefore, suggest that monitoring of glycemic control of diabetic patients in southwest Ethiopia may be less than optimal

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							and this may be a contributory factor to late detection of patients at risk of complications and death from poorly controlled type 2 diabetes. (7f) Performing recommended self-care practices Knowledge and practice of basic components of diabetes self-management practices were generally low among the patients studied. However, it was significantly higher among patients who never missed their medication and those that have excellent and very good adherence to their prescribed anti diabetic medications (7f) Performing recommended

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							<u>self-care practices</u> This study revealed that adherence to antidiabetic medication by type 2 diabetic patients is problematic, as only 51.3% of the patients never missed their daily medication and 20.8% and 28.2% of the patient had excellent and very good adherence respectively, which is similar to that found by other studies. <u>(7i) Health care provider/patient interaction</u> Only 11(6.5%) of patients among those who missed their medication frequently and sometimes, claimed to have disclosed this to

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							physicians during consultation. The frequently identified factors for non-disclosure were lack of privacy (81; 51.1%) due to patient overcrowding and sharing of consulting rooms by physicians, short consultation time leading to limited physician–patient contact (53; 33.5%), and unfriendly relations with physicians (24; 15.2%). <u>(7h) Cost/ infrastructure for intervention</u> In Ethiopia, the cost of medication is subsidised by government for some patients. Adopting viable cost-reduction strategies, such as pooled procurement,

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							encouraging prescription of low price but good quality generic antidiabetic drugs and strengthening of provision of subsidies by government and collaboration with donor agencies may increase patient access to the needed antidiabetic medications, and improve adherence (7e) Diabetes education, awareness and health promotion Generally, because self-management practices were generally low among the patients studied, indicates the need for educational empowerment if successful self-management is to be achieved.

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							This could be done through a number of motivational strategies, such as scheduled home visits by designated health extension workers, to evaluate and strengthen adherence to medications and self-management practices, peer education and experiences through patient support groups; and confidential counseling by health professionals, with each focusing on specific issues pertaining to their contributions to the diabetes care process. <u>(7g) Treatment modalities</u> The study shows that the majority of patients with type 2 diabetes in southwest

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							Ethiopia are managed with OHA monotherapy. (7f) Performing recommended self-care practices The current prescribing strategy achieved glycemic control for less than half the patients, while the majority are fail to meet the recommended blood glucose target. This appears to be due mainly to poor adherence to the prescribed drug regimen and poor knowledge and practice of self-management behaviors. (7g) Treatment modalities There is a need for regular appraisal of drug prescribing and

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							better monitoring of patient adherence to prescribed antidiabetic drugs and other diabetes self-management practices. Training in learning processes and factors governing behaviour are essential for all involved in delivery of patient care. <u>(7e) Diabetes education, awareness and health promotion</u> Education programmes should recognise the wide range of learning strategies used by different people. <u>(7g) Treatment modality</u> The prescriber, before prescribing, and pharmacist, before

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							dispensing drugs for diabetic patients, should negotiate the treatment plan so that the patient understands and commits to it.
Baumann, L.C., Frederick, N., Nankwanga, B., Ejang, J. & Nambuya A. (2015) 'A demonstration of peer support for Ugandan adults with type 2 diabetes', 22(3), pp. 374–383. https://doi.org/10.1007/s12529-014-9412-8 (Record 20) SUMMARY Aim: To test the feasibility of a peer intervention to improve the following: (1) diabetes self-care behaviors, (2) glycemic control, (3) social support and emotional well-being, (4) linkages to health care providers, and (5) to assess the sustainability of the intervention 18 months later. Study design: Quasi-experimental study.	(1c) Lifestyle It is possible that heightened awareness of lifestyle habits during the study period resulted in changes that impacted blood pressure. (1f) Language Materials were in English, though educational sessions were conducted in both English and Luganda. Even with these efforts, not everyone was reached, since some spoke a tribal language other than Luganda, and little English.	(2g) Physical state/systemic illness The drop in mean diastolic blood pressure post-intervention, from 85 to 76 mmHg, is clinically significant. (2c) Education The significant difference in education level of champions and partners reflects the English language inclusion criterion used for champions. (2g) Physical state/systemic illness The average diastolic blood pressure	(3a) Perceptions related to diabetes/DSM Perceptions of social support, emotional wellbeing, and confidence in self-management did not change. (3a) Attitude/ perceptions related to diabetes/DSM Qualitative data from the final evaluative meeting included a participant who testified that one sentence in the training booklet struck him deeply: "You are not alone with diabetes". These words made him realise how isolated he had	(4a) Mental illness comorbidity Data reflect the emotional burden of diabetes. For one item on this scale "diabetes makes me feel sad and depressed," 47.8% of the participants reported this to occur "sometimes" or "a lot" in pre-intervention and 43.9% in post-intervention. The strong association between depression and diabetes is derived from predominantly US samples.	(5a) Perceived risks/barriers/ challenges In this community, all dietary change may not have been voluntary, since participants reported reducing the number of meals they ate per day due to local food shortages. (5a) Perceived risks/barriers/ challenges The most frequent problems reported included not talking often enough (56%, n=23), not being able to contact their peer (44%, n=18), being told what to do (31%,	(6b) Mass media e.g. radio, TV, mobile phone apps Electronic phone logs and data from participant logbooks show that most participants used both telephones and the network of peer supporters and contacted the diabetes clinic more often than pre-intervention. Electronic phone records showed that 68% of participants made phone contact with a peer at least weekly. (6b) Mass media	(7f) Performing recommended self-care practices Of the health behaviours measured, only healthy eating significantly changed in a positive direction from pre-intervention to post-intervention. (7e) Diabetes education, awareness and health promotion Attendance of the first and second education meetings was 76% (n=31) and 88% (n=36), respectively. (7b) Peer support

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Study area: Diabetes clinic in Mityana, a rural community in Uganda. Study population: Adults 18 years and above. Data collection instruments: Diabetes self-care questionnairre, narrative notes, phone records, participant logbooks.		dropped from 85.39 to 76.27 mmHg ($p<0.001$), and the average A1C values changed from 11.10 to 8.31% ($p<0.005$). Seven participants had a pre-A1C value of <7% while 13 participants had a post-A1C value of <7%. Average BMI values and categories did not change. (2d) Socio-economic status To many participants, "missing medications" meant that they could not obtain medications due to lack of availability or high cost, not simply forgetting to take them, or that they stopped daily medication when they felt better.	felt with this condition before the peer intervention. In the post-intervention evaluation meeting, several participants reported that they felt that their care had improved, even in the hypertension clinic, since they felt more knowledgeable as patients. Participants also reported experiencing more energy and less pain as a result of making changes.	(4b) Emotional influences Participant satisfaction was high.	n=13), and having a peer who was not motivated to change (25%, n=10). (5a) Perceived risks/barriers/ challenges In addition to the challenge of translation, many participants had difficulty reading. 92% of the participants reported blurred vision; this may be secondary to diabetic retinopathy, which is especially high in African populations [39], or due to a lack of corrective eyewear to correct vision changes associated with aging. (5a) Perceived risks/barriers/ challenges Participants said that	Findings support others who found that telephone-based peer support can be used alone or with other peer support interventions and is especially useful when patients are divided by distance, as they are in rural settings.	When reporting total contact with peers, 93% (n=40) used cell phones, and 60% (n=28) reported personal contact. Of participants who completed the study, none had fewer than six contacts with a peer during the intervention period. (7f) Performing recommended self-care practices An item from the post-questionnaire about how often they contacted the diabetes clinic, using a three-point scale (more often, less often, or the same as before the programme) showed that 89.7% (n=35)of participants reported increased contact with a health care

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		(2g) Physical state/systemic illness 80% of participants had a blood pressure reading that exceeded130/80 mmHg preintervention, compared to 56% post-intervention (2d) Socio-economic status 71% reported difficulty obtaining medications because of cost or availability. (2c) Education Low literacy was addressed by administering all study materials in group meetings. Items were read aloud in either English or Luganda, depending on requests by participants, and researchers and clinical staff were			transportation problems in getting to the clinic and access to medications remained challenges.		providers during the intervention. (7e) Diabetes education, awareness and health promotion Responses to items about the problems and benefits of the intervention showed that 80% (n=33) received helpful advice and were encouraged to contact the clinic; 72% (n=30) reported receiving encouragement in their diabetes care, learned a lot, and could talk to someone else about diabetes (7b) Peer support groups/inter-ventions Data from logbooks showed that participants encouraged each other to exercise as much as they could, encouraged

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		available to assist individuals. Participants could listen to the question and be assisted in recording their answers. <u>(2g) Physical state/systemic illness</u> A1C and DBP improved over a 4-month intervention.					healthy eating and consistency in taking medication daily. <u>(7f) Performing recommended self-care practices</u> Content analysis of logbook notes of nine champions and five partners revealed that conversations focused on the following: healthy eating, taking medication consistently instead of only when you feel ill, exercising more, knowing when to contact the clinic nurse, and emotional well-being and support. <u>(7b) Peer support</u> Content analysis also showed that both champions and partners gave support and answered questions.

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							(7f) Performing recommended self-care practice Telephone records and patient logs show that a large portion of the partner-champion interactions focused on diet, specifically eating less sugar and more fruits and vegetables. (7e) Diabetes education, awareness and health promotion Increased awareness of healthy eating through discussions with peers may be a reason for the significant improvement in self-reported eating behavior over the study period. (7f) Performing recommended self-care practices

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							Average A1C levels demonstrated a significant change from pre-intervention to post-intervention, from 11.1 to 8.3%, representing a drop of 2.8%. This large drop in A1C is difficult to attribute to dietary changes alone. One explanation is that, despite no difference in pre- and post-ratings of frequency of missing medications, this item may not have accurately captured medication-taking behaviour. <u>(7f) Performing recommended self-care practices</u> Data from participant logbooks and meeting notes provided evidence that a

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							frequent topic of conversation was how to properly take medications, not only when one is feeling sick, but consistently, every day. Therefore, it is possible that the significant drop in A1C resulted from consistent medication taking combined with dietary changes. <u>(7b) Peer support</u> Participants in this study did not use a champion and partner model but engaged in providing reciprocal support. The initial rationale for the champion role was to ensure engagement of participants. However, at the first meeting, partners asked if they could share

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							advice in addition to asking questions of the champion. Therefore, it is not surprising that both groups of participants initiated contact, provided supportive communications, and reported knowledge gaps. There were no differences in study outcomes by the role of champion or partner This supports the comments in the post-intervention meeting that participants perceived that their care had improved “even in the hypertension clinic”. <u>(7i) Health care provider/patient interaction</u> All participants reported increased

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							contact with the diabetes clinic nurse, through telephone or by attending the clinic during the intervention. <u>(7b) Peer support groups/inter-ventions</u> In low-resource settings, peer support takes on even greater relevance, as it reflects a form of task-shifting. Task shifting is the delegation of tasks associated with providing disease management care traditionally performed by physicians to other health care workers, such as nurses or trained lay people. This study relied on district hospital personnel who managed the diabetes clinic in addition to their

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							other work duties, and who could devote only a part of their time to diabetes care, despite the growing need. (7e) Diabetes education, awareness and health promotion The clinic staff were left with written bilingual (English and Luganda) educational materials that could be used as resources that could be shared with others. (7h) Cost/infrastruc-ture for interventions The upgraded clinic facilities could better accommodate patients, and a covered porch provided space for future diabetes club meetings.

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							(7d) Self-care resources Participants were offered corrective eye glasses, as discussed below, to facilitate the ongoing use of written materials. (7e) Diabetes education, awareness and health promotion Bilingual materials produced for the study, such as a foot care poster and a bilingual diabetes self-care education booklet, were disseminated several ways. Foot care posters were distributed to all district hospital diabetes clinics, about 40, in the country. (7d) Self-care resources Bilingual self-care booklets were given to all participants, and

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							several reported that this material was a valuable resource to share with other villagers who had questions about diabetes; booklets were also used by health care professionals for diabetes education. (7e) Diabetes education, awareness and health promotion The foot care poster and booklet were presented to the Ugandan Ministry of Health for Chronic Disease Management for official approval and distribution to public service clinics. (7e) Diabetes education, awareness and health promotion From the provider perspective, a

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							lasting effect of the intervention was the positive experience of clinic personnel in having knowledgeable and engaged patients. <u>(7i) Health care provider/patient interaction</u> Clinic manage-ment changed in several ways. First, because of the increased numbers of persons with diabetes needing care, routine follow-up was changed to every 2 months, from monthly. Patients have a 15–30-min. appointment with the nurse that occurs at a scheduled time; in Uganda, it is uncommon for patients to honour appoint-ments for seeking care, which often results in

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							extensive waiting times at clinics. <u>(7b) Peer support</u> Patients who had been participants in the peer support intervention were scheduled for appointments on the same clinic day as their partners, to facilitate ongoing contact. <u>(7e) Diabetes education, awareness and health promotion</u> Every diabetes clinic day now begins with a 1-hour education session <u>(7g) Treatment modalities</u> The hospital director reports that the diabetes clinic has a lower missed appointment rate and better adherence to treatment rate than other clinics

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							in the district hospital. <u>(7b) Peer support</u> The participants who were interviewed said that they still interacted with and received support from study participants, although their contact is less frequent. <u>(7e) Diabetes education, awareness and health promotion</u> Patients remember the education they received about diabetes self-care and noted that they value and continue to use the printed booklet. <u>(7b) Peer support</u> One participant said “since eating more green vegetables is encouraged when I see my

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							partner at the clinic I share with them vegetables from my garden". (7b) Peer support Another initiative that emerged from this project was extending the reach and evaluation of the potential benefit of a peer support intervention for diabetes. The two Ugandan physicians on this project received further funding to demonstrate a peer support model in 10 additional district hospital diabetes clinics. (7g) Treatment modalities Aspects of the intervention were sustained for 18 months after funding ended and incorporated

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							into the delivery of diabetes care. (7e) Education, awareness and health promotion The intervention effected recognition of how education and active engagement of both patients and providers can improve both physiologic outcomes and patient and clinician satisfaction
Fisher, E.B., Boothroyd, R.I., Coufal, M.M., Bauman, L., Mbanya, J.C., Rotheram-Borus, M.J., Sanguanprasit, B. & Tanasugarn, C. (2014) 'Peer support for self-management of diabetes improved outcomes in international settings'. *Health Aff*, 31(1), pp. 130–139. https://doi.org/10.1377/hlthaff.2011.0914.Peer Summary	(1b) Values, norms and cultural beliefs The project in Cameroon addressed cultural concerns, such as including a family member or friend in home visits with Muslim patients. (1a) Religion/ religious practices	(2g) Physical state/systemic illness During the six-month project in Cameroon, significant decreases were observed in the participants' average body mass index (from 28.6 to 25.5 kg/m^2) and their systolic (from 142 to 124.4 mmHg) and diastolic (from	(3a) Attitudes/ perceptions related to diabetes/DSM Final evaluation feedback from participants indicated that they perceived that care received from clinic staff members had improved. This might encourage patients to become more engaged in their	(4b) Emotional influences Group and individual contacts provided opportunities for encouragement and attention to emotional and motivational issues surrounding diabetes management. Aspects of social and emotional	(5b) Perceived benefit/enabler It should be recognised that support programs are neither a panacea for weak health systems nor a cheap option for providing care for disadvantaged populations. Indeed, rather than cheap care for poor people,	(6b) Mass media Telehealth contributed to peer support. Texting and telephone contacts among participants in South Africa and Uganda and automated text prompts in South Africa encouraged disease management.	(7b): Peer support The peer support project in Cameroon sought to take advantage of naturally occurring social connections and recruited both peer supporters and participants with diabetes through existing social networks based on tribe or clan, profession,

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Aim: Identifying peer support functions in diabetes management Study design:	In South Africa, women were determined to find out why they had diabetes, often attributing their disease to having committed a sin or having been victimised by witchcraft. Their coping styles relied heavily on trusting in God (endorsed by 100% of the participants) and praying “often” or “almost always” (68%). Accordingly, participants adopted the practice – common for gatherings in this area –of starting and ending sessions with a prayer and a song. <u>(1f) Language/ tribe</u> Uganda illustrates the challenge	84.4 to 77.7 mmHg) blood pressure. <u>(2g) Physical state/ systemic illness</u> The participants’ average diastolic blood pressure dropped from 85.39 to 76.27 mmHg, and average HbA1c declined from 11.1% to 8.3%. The number of participants with HbA1c values less than 7% nearly doubled, from 17% to 32%.	own clinical care in the future.	support were among the skills emphasised during training of peer supporters. <u>(4a) Mental illness comorbidities</u> In Cameroon, peer supporters provided opportunities to discuss emotions such as depression and concerns about complications that participants felt uncomfortable raising with health care professionals or in group sessions. <u>(4b) Emotional influences</u> In both South Africa and Uganda, text messaging and telephone contacts were seen to be effective channels, not only for	peer support may constitute good care for all people.	<u>(6b) Mass media e.g. mobile phone applications (South Africa)</u> Pairs of participants used mobile phones to call and text each other. The project sent daily texts to provide nutrition guidance and to prompt participants to walk or get other exercise. A central computer documented these contacts. <u>(6b) Mass media e.g. mobile phone apps</u> Each champion was matched with 1 or 2 partners and, along with diabetes clinic staff, given mobile phones that were linked in a prepaid network. Champions and	religion or church membership, residential quarter, or sports group. The project chose the most suitable 10 to become supporters, with each serving a group of 10 participants. Peer supporters met monthly with their groups of participants to discuss self-care activities. Additionally, individual contacts were frequent: Peer supporters made at least 3 planned face-to-face visits and 2 unplanned visits each month to each participant. Participants also frequently contacted peer supporters by telephone, and supporters routinely followed

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	involved in conducting a project in a setting with multiple languages. Training for peer support champions was in English, so the champions had to be able to read and speak English. However, partners quickly requested that the facilitator at their training sessions use Luganda, the dominant language in the region. Because not all participants spoke Luganda, the project had to provide interpreters for Acholi or Swahili speakers, too.			prompting self-management, but also for exchanging encouragement and emotional support. In addition to providing an overview of self-management, the one-day diabetes camp in Thailand gave village health volunteers and participants the networking skills needed to engage in subsequent social and emotional support. (4b) Emotional influences Group and individual contacts provided opportunities for encouragement and attention to emotional and motivational issues surrounding		partners agreed to make contact with each other at least weekly by telephone or in person. They also kept logs of the content of these calls in booklets provided by the project. (6b) Mass media e.g. mobile phone application Telehealth contributed to peer support. Texting and telephone contacts among participants in South Africa and Uganda and automated text prompts in South Africa encouraged disease management. (6b) Mass media e.g. mobile phone app In South Africa, participants in	these calls with a home visit. (7c) Social support The project in Thailand developed and tested a curriculum to increase volunteers' ability to improve diabetes management (7e) Diabetes education, awareness and health promotion Surveys and focus groups with 400 patients and 200 volunteers guided curriculum development. (7i) Health care provider/patient interaction 40 village health volunteers completed training. They then worked with staff members from village health

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
				diabetes management. Aspects of social and emotional support were among the skills emphasised during training of peer supporters <u>(4a) Emotional influences</u> In Cameroon, peer supporters provided opportunities to discuss emotions such as depression and concerns about complications that participants felt uncomfortable raising with health care professionals or in group sessions. <u>(4b) Emotional influences</u> In both South Africa and Uganda, text messaging and telephone contacts were seen to be		Diabetes Buddies texted their buddies approximately 5 times weekly and responded to 54% of daily automated text messages. <u>(6b) Social media/mobile phones</u> Automated electronic phone records showed that 68% of the participants made a phone contact with a peer at least weekly and that none of them had fewer than 6 contacts with a peer during the intervention period. 87% (40 patients) reported using mobile phones, and 61% (28 patients) reported making personal contact with peers.	centres to organise meetings of patients with type 2 diabetes to inform them about the project. <u>(7c) Social support</u> Each of the 40 volunteers recruited at least 3 village residents with diabetes. In urban Nakorn Rajasima, weekly small-group discussions and individual volunteers' visits were followed by monthly visits by a volunteer and a health centre staff member. In rural Supan Buri, group activities included daily exercise sessions and biweekly to monthly discussions of self-management among patients,

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				effective channels, not only for prompting self-management, but also for exchanging encouragement and emotional support among participants. In addition to providing an overview of self-management, the one-day diabetes camp in Thailand gave village health volunteers and participants the networking skills needed to engage in subsequent social and emotional support.		(6a) Social media/mobile phone As illustrated in the use of telephone networking, texting, and automated text prompts in South Africa and Uganda, opportunities also appear to exist for synergies between the “soft touch” of peer interventions and the “high tech” of telehealth.	village health volunteers, and health center staff. Volunteers also visited patients individually every 2 weeks, or as needed. (7h) Cost/infrastruc-ture for interventions Volunteers integrated the services delivered to groups and individuals with community-level efforts to develop resources to facilitate diabetes management. For example, in rural Supan Buri, one village developed a community garden, then hooked up an old bicycle to drive a generator and pump to irrigate the garden. The bicycle was also used as an

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							exercise bicycle for participants who wanted to increase their physical activity. (7b) Peer support In Uganda, peer "champions" were to provide support to "partners." This project emphasided both mobile phone and face-to-face contact. (7e) Diabetes education, awareness and health promotion Partners received the same DSM education as champions, except that champions also received a communications module. The project developed a bilingual (English and Luganda) training booklet organised

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							according to the AADE7 Self-Care Behaviors – e.g. healthy eating, being active, and taking medication – of the American Association of Diabetes Educators. Instructions on completing diaries of diet, exercise, and medication use; and guidelines for when to contact health care providers were included. During the project, the clinic staff offered 2 "booster" meetings that reviewed material from the earlier educational classes, including ways in which champions and partners could support each other. (7f) Performing recommended

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							<u>self-care practices</u> The logs revealed several main themes: healthy eating, taking medication consistently instead of only when feeling ill, increased exercise, and emotional well-being and support. <u>(7b) Peer support</u> The distinction between champions and partners gradually diminished, and support between them became reciprocal. <u>(7b) Peer support</u> All four projects included individual and group meetings that emphasised “pragmatic” aspects of diabetes management.

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							In Cameroon, e.g., participants cooked meals in a group to learn healthier cooking methods and experience directly that healthy food can be tasty and enjoyable. Peer supporters' discussions with individuals also addressed specific ways in which they might overcome barriers to implementing their daily self-management. <u>(7h) Cost/ infrastructure for intervention</u> Peer supporters helped provide community resources that encouraged daily self-management. For example, in Thailand, the converted bicycle that powered irrigation for the community

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							garden gave people with diabetes an opportunity for exercise. <u>(7i) Health care provider/patient interaction</u> All four projects encouraged participants to obtain appropriate clinical care and connected peer support personnel with health care professionals. In Cameroon and Uganda, the projects were based in diabetes care settings, so peer supporters found it easy to facilitate appropriate care for patients, help arrange appointments, or accompany patients on visits to clinical providers.

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							In Thailand, village health volunteers worked out of community health centres and regularly interacted with professional staff. In South Africa, participants were recruited through health clinics and encouraged to obtain appropriate care. In Uganda, the prepaid mobile phone network linking participants to each other also linked them to nurses in the health centre, who encouraged them to call with questions about disease management. Health professionals helped lead some intervention components in

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							Thailand and Uganda. Instead of diluting the peer aspect of interventions, the involvement of professionals reduced peer supporters' anxiety about making mistakes and increased the projects' credibility. In Thailand, for example, health centre staff reinforced advice that participants had received from village health volunteers, thereby alleviating skepticism. In differentiating the roles of peer supporters and professionals, the project in Cameroon emphasised the distinctive, complementary roles of peers in linking patients to

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							appropriate clinical care. <u>(7b) Peer support groups/inter-ventions</u> Flexible and convenient meeting times were features of the peer support system in Cameroon, and were intended to increase its long-term attractive-ness to participants. In Thailand, the long history – spanning more than 30 years – of the village health volunteers helped ensure the programme's long-term stability, and the introduction of telephone networking and, in South Africa and Uganda, messaging added a convenience factor to peer support.

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							(7i) Health care provider/patient interaction In Uganda, 89% of the 46 patients who entered the project attended an evaluation meeting 4 months later; 5 patients did not attend because of failing health or employment duties. (7g) Treatment modalities Participants' average glycated hemoglobin (HbA1c) had declined markedly, from 9.6% to 6.7%. The HbA1c blood test measures the average amount of sugar in the bloodstream for the prior three months. It is commonly used to gauge the effectiveness of medication, diet, and

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							exercise in patients with diabetes. A score of 5.7% or less is considered normal. Before the project, 85 of the 96 participants had had HbA1c greater than 8%. After the project, only 4 were still above 8%, and 65 were below 7.0% – a score that indicates good control of blood glucose. (7f) Performing recommended self-care practices Survey data shows that participants' diets had become healthier and that they were doing better on measures of exercise and self-efficacy, (7f) Performing recommended

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							<u>self-care practices</u> Questionnaire responses by participants in the Ugandan project indicated improvement in dietary behaviour. <u>(7b) Peer support groups/inter-ventions</u> Following the end of the initial 12 sessions of Diabetes Buddies in South Africa, participants continued to meet weekly, and expanded their numbers. Women for Peace, a local nongovernmental organisation that coordinated the project's implementation, has obtained additional funding to continue it. Women for Peace is also

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							partnering with other non–governmental organisations and with academic and software development organisations in the region to continue to strengthen its peer support projects, which address a number of needs that women have. <u>(7b) Peer support groups/inter-ventions</u> The village health volunteers in Thailand provided a framework for institutionalising the peer support project, so that it reaches a large portion of the population. Circumstances in Thailand provided unusual evidence of the

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							project's sustainability. In spite of political unrest, flooding, and an outbreak of dengue fever, the volunteers persisted and adjusted the way they provided support as needed. For example, when some volunteers were called away to areas of special need, others developed plans for taking turns to visit diabetes patients and communicate with patients by mobile phones (7h) Cost/infra-structure for intervention In Uganda, modest funds of the rural diabetes clinic enabled the project to build a covered porch with benches where

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							participants could meet for group education sessions and meeting with clinic staff. <u>(7e) Diabetes education, awareness and health promotion</u> The development of the bilingual diabetes self-care training booklet encouraged continued activities. For example, one woman reported that possessing this booklet had made her a village resource: People with diabetes visited her to gain information from it. <u>(7b): Peer support groups/ interventions</u> In Thailand and 3 countries in sub-Saharan Africa, peer support

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							projects for people with diabetes proved to be feasible; successful in reaching and engaging their intended audiences; effective in changing key health behaviour; and, in 3 of the 4, improving key clinical measures and patients' quality of life. <u>(7b) Peer support/ interventions</u> The project in Thailand placed somewhat greater emphasis on small-group and individual support in urban settings, relative to greater emphasis on group activities such as daily exercise sessions and general monthly discussions of self-management

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							in smaller, rural villages. <u>(7b): Peer support/ interventions</u> Key functions of peer support can provide a basis for standard-isation and, as shown, can be applied in a wide range of settings. Peer supporters who have time to talk with patients and also have experience with their daily circumstances, can provide credible, practical assistance in initiating and maintaining the daily behavioural patterns that are central to the management of chronic disease. <u>(7h): Cost/infra-structure for intervention</u> Peer supporters, who have time to talk with patients and also have

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							experience with their daily circumstances, can provide credible, practical assistance in initiating and maintaining the daily behavioral patterns that are central to management of chronic disease <u>(7b) Peer support/ interventions</u> At the same time, greater inclusion of peer supporters in health care would also present questions about appropriately organising and delivering services. These include the need to provide staff time for the training, ongoing supervision, and support of peer supporters; and incentives to

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							recruit and retain peer supporters. In addition, clear outcome indicators pertinent to evaluating costs and benefits of peer support would need to be identified. <u>(7h) Cost/infra-structure for intervention</u> Peer support programmes might seem unaffordable in the current environment. The Thai health care system, which spent the equivalent of US$168 per capita in 2009, compared to the US$7,410 per capita spent by the US health care system in the same year, has been able to afford the village health volunteers since 1978.

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							(7f) Performing recommended self-care practices Evidence from the projects described here suggests that such interventions improve patients' health behaviour, metabolic control, and quality of life. Peer support, then, appears to be a useful and versatile strategy for promoting the kinds of daily, ongoing behavioural efforts that are central to the management of diabetes, as well as most other chronic diseases.
Baumann, J.L., Opio, C.K., Otim, M., Olson, L. & Ellison, S. (2017) 'Self-care beliefs and behaviors in Ugandan adults with type 2 diabetes', *The Diabetes Educator*, 20(10), pp. 1–9.	(1f) Language/ tribe The sample reflected 30 tribal groups, with Muganda	(2a) Age The mean age was 53.5 years. Mulago participants were younger (mean age, 51 years)	(3a) Attitudes/ perceptions toward diabetes/DSM When asked if they could tell if blood glucose levels were too	(4b) Emotional influences The high percentage of patients reporting feeling worried, overwhelmed, and sad or	(5a) Perceived risks/barriers/ challenges Responses indicate the scarcity of resources for comprehensive		(7f) Performing recommended diabetes self-care practices A little over half of participants reported activities of daily

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https://doi.org/10.1177/0145721709358460 Record 281 (781) <u>Summary</u> Aim: To describe illness beliefs and diabetes self-care behaviors of Ugandan adults with type 2 diabetes. Study design: Cross-sectional study. Study area: Outpatient diabetes clinics in Kampala, Uganda. Kampala Diabetes Center (KADIAC), one of the largest private diabetes clinics in Uganda with over 7 000 registered patients. Data collection instruments: A modified version of the Diabetes Selfmanagement Assessment Tool (D-SMART) was used. Data collected by means of interviews.	comprising the majority (58%). <u>(1c) Lifestyle</u> 24-hour food histories revealed a typical Ugandan carbohydrate-rich diet of *matooke* (steamed plantains), posho, millet, rice, and potatoes, with lesser intake of meat or green vegetables, fruit, and milk; <u>(1c) Lifestyle</u> Only 6 men in the sample reported smoking. <u>(1c) Lifestyle</u> Comments on the foot care handout were that some content was not consistent with cultural practices, such as showing nail clippers instead of double-edged razor blades that	than KADIAC participants (mean age, 58 years <u>(2b) Gender</u> 144 (42%) were men. <u>(2h) Duration of illness</u> The mean duration of diabetes was 61 months (SD, 63.6), or 5 years. <u>(2f) Family history</u> 41% reported a family history of diabetes. <u>(2c) Education</u> Nearly half (47%) of participants reported education at a primary shool level or below. More women (24.1%) reported primary school education or less compared to men. A greater portion of Mulago	high, 87.9% responded “yes.” <u>(3a) Attitude/perception related to diabetes/DSM</u> Diabetes was generally viewed as a very serious, life-long disease yet one that a person can exert “some” to “a lot” of control over (3c) Self-efficacy/attitude towards self When asked how sure they were about being able to make these changes, half of the participants had some level of doubt about making changes. <u>(3a) Attitude towards diabetes/ DSM</u> The greatest difficulties they identified were	depressed highlights the need to address psychosocial issues That the majority of participants reported high levels of family and peer social support suggests that family and peers are crucial resources for addressing the emotional challenges of day-to-day management. <u>(4b) Emotional influences</u> The findings also highlight the need for psychosocial support	diabetes care; only a third of participants reported having had their teeth, eyes, or feet checked by a health care worker in the past year. <u>(5a) Perceived risks/barrier/ challenge</u> However, in this study, most patients reported taking insulin, a regimen that carries a risk of hypoglycemia, and death, if not managed accordingly and adjusted to diet, physical activity, or acute illness		living as their usual exercise, which included work related activity such as walking to work. Significantly more men than women reported a regular programme of exercise: half of men compared to less than a third of women. The majority of participants reported making recommended dietary changes, such as limiting sweets and fats. Women were more likely to report limiting fatty food than men. <u>(7g) Treatment modalities</u> A high proportion (90.8%) of participants reported using insulin alone or in combination with an oral

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	are used to cut toenails, and pictures of skin "lotion" instead of the more commonly used petroleum jelly to soften skin. (1c) Lifestyle Findings on self-care behaviours reveal that over half of participants reported typical activities of daily living as regular exercise. This is not surprising, because activities such as jogging or swimming are not the cultural norm. (1b) Values, norms and cultural beliefs A cultural belief is that all food is carbohydrate and that meat and vegetables fall into a different food group.	participants reported education at the primary school level or less compared to KADIAC. (2d) Socio-economic status Although 88% of participants were employed, when rating the adequacy of income (1 = no income, 5 = very adequate), 80% of the ratings were 3 (barely adequate) or less. (2d) Socio-economic status The most frequent reason for missing medications was the inability to afford them (n=61, 37.9%). (2g) Physical state/systemic illness Men rated more interference with sexual function	that the behavior change was "too difficult" (31%) or that they "did not have enough time" (29.8%) (3a) Attitude towards diabetes/DSM A number of participants told the interviewer that they stopped taking medications when they were feeling better, despite agreeing that it was a life-long condition. (3a) Attitude/perception towards diabetes/DSM Diabetes was widely viewed as a serious long-term illness that required being more physically active, restricting dietary fat and sugar, and taking medications.				hypoglycemic agent. (7c) Family/social support Over 80% of participants reported "a lot" or "some" family support in managing diabetes. (7i) Health care provider/patient interaction 66.4% reported they would see a health care provider if they thought that their blood glucose level was too high. (7e) Diabetic education, awareness and health promotion When asked if they could tell if blood glucose levels were too low, only 38.8% responded "yes". A fifth (20.5%) of participants did not know the cause of high

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
	One participant commented, “I’m not an animal to eat green vegetables”, thereby exemplifying a common attitude about eating vegetables. (1c) Lifestyle Although 81% of participants reported “never missing a meal”, we need to use caution in interpreting the meaning of this finding. In Uganda, breakfast is generally a small meal consisting of tea and a grain such as *posho* or millet; lunch is eaten in the late afternoon, and dinner is not eaten until 9 or 10 pm. Therefore, despite participant reports of few missed meals,	(m=2.73) than women (2d) Socio-economic status Women expresed greater concerns with complications of diabetes compared to men, with means of 2.73 and 2.47, respectively (t=2.02 [1336], P=.044), and reported more interference with job, school, or daily activities than men. (2d) Gender There were no gender differences in relation to taking medication, problem-solving, or risk reduction behaviours. (2g) Physical state/systemic illness Poor vision and numbness of fingers or toes were reported by	(3b) Stigma Similar to HIV/AIDS, diabetes carries a stigma that one has a deficiency.				blood glucose, and 60.7% did not know the cause of low blood glucose. (7f) Performing recommended self-care practices The most frequently identified self-care goals were to exercise more (23.2%), make better food choices (23.2%), prevent high blood glucose (13.0%), and have blood glucose checked more often (10.1%). (7e) Diabetes education, awareness and health promotion Some patients who denied knowledge deficits and acknowledged diabetes as a life-long condition asked questions such as “Why are

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
	dietary intake patterns throughout the day are uneven and can present challenges for someone whose treatment plan consists of 2 daily insulin injections or oral medications (1d) Environ–mental factors Traveling with insulin presents an additional obstacle in a tropical climate, where there is a greater risk of inactivating insulin due to heat exposure, especially for men when it is carried close to the body in the pocket of a shirt or trousers. (1b) Values, norms and cultural beliefs More men than women report interference with	over 75% of participants. (2d) Socio-economic status A third of patients reported missing work or school in the past 3 months because of their diabetes. (2g) Physical state/systemic illness The mean systolic blood pressure was 136 mmHg (SD, 1.61), the mean diastolic blood pressure was 88 mmHg (SD .86), and the mean random blood glucose was 203 mg/dL (11.27 mmol/L) (SD, 6.31). Most participants had an elevated systolic or diastolic blood pressure and waist circumference and random blood glucose measures that					you asking me about my feet?" or "Will I be cured?" (7f) Performing recommended self-care activities Few did home glucose monitoring. (7i) Health care provider/patient interaction Seeing a health care worker was the most frequent coping strategy for high or low blood glucose. (7g) Treatment modality A surprising finding is the high percentage of participants reporting insulin use, either alone or in addition to an oral agent. (7h) Cost/infra-structure for interventions There is free insulin

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	sexual functioning. Considering the high value of fertility in most African cultures, including Uganda, this dysfunction presents a significant psychosocial issue for sexually active men who hope to marry and who expect their wives to bear their children. <u>(1c) Lifestyle</u> Most Ugandans still prefer to cut their toenails with a double-edged razor blade, which is potentially disastrous for a diabetic patient with poor eyesight and numbness. <u>(1b) Values, norms and cultural beliefs</u> Women were especially	exceeded normal or optimal values. Height and weight measurements were used to calculate body mass index. 43% of participants had a BMI in the normal weight category, while 52.1% had a BMI of 25 or greater, putting them in overweight (33.4%) or obese (18.7%) categories. A greater proportion of women were obese than men. <u>(2g) Physical state/systemic illness</u> The most common symptom reported was fatigue/weakness.					distribution at Mulago while the supply lasts, whereas patients may have to pay for oral agents that are costly and not always available. <u>(7f) Performing recommended self-care practices</u> The risks of insulin treatment are exacerbated further by the absence of home blood glucose monitoring. <u>(7i) Health care provider/patient interaction</u> Data on problem-solving and risk reduction behaviours showed that most patients (66.4%) would seek advice from a health care worker if their blood glucose was high. <u>(7f) Performing recommended</u>

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
	reluctant to remove their *busuti*, the traditional dress of the region. (1c) Lifestyle In an environment where patients cannot afford to purchase medications consistently, relying on lifestyle and self-care strategies is critical.	(2g) Physical state/systemic illness Blood pressure, blood glucose, and anthropo-metric measure-ments indicated that the majority of participants had poor metabolic and blood pressure control. (2d) Socio-economic status Despite high ratings of social support, participants reported substantial negative social, emotional, and economic burdens associated with diabetes. (2d) Socio-economic status The differences between participants from a public (Mulago) and private clinic (KADIAC) were minimal.					self-care practices Fewer reported making any adjustments in medications, diet, or checking their blood glucose level. (7i) Health care provider/patient interaction This finding is not surprising because the Ugandan doctor-patient relationship is more paternalistic than Western practices, with the doctor acting as the authority and decision-maker while the patient is a passive recipient of care. However, due to a scarcity of health care providers trained to provide diabetes care, obtaining timely and accurate

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		Although KADIAC patients were somewhat older and less educated, participants from both sites reported inadequate income as a challenge, despite the fact that Mulago care is free and KADIAC requires patients to pay for each consultation. <u>(2d) Socio-economic status</u> Despite the high percentage of participants reporting attempts to avoid sweets and limit fats, inadequate income contributes significantly to the lack of healthy food choices, with diets consisting mainly of carbohydrate-rich foods, especially *matooke*.					advice may be difficult for most patients. <u>(7e) Diabetes education, awareness and health promotion</u> 83.8% of participants reported having attended a diabetes education class presented by a doctor or nurse. At Mulago Hospital, all newly diagnosed diabetes patients receive a group educational session by the diabetes nurse specialist. <u>(7h) Cost/infra-structure for interventions</u> However, the large numbers of patients and lack of space typically overwhelm the capacity of the clinics and hinder sufficient comprehensive

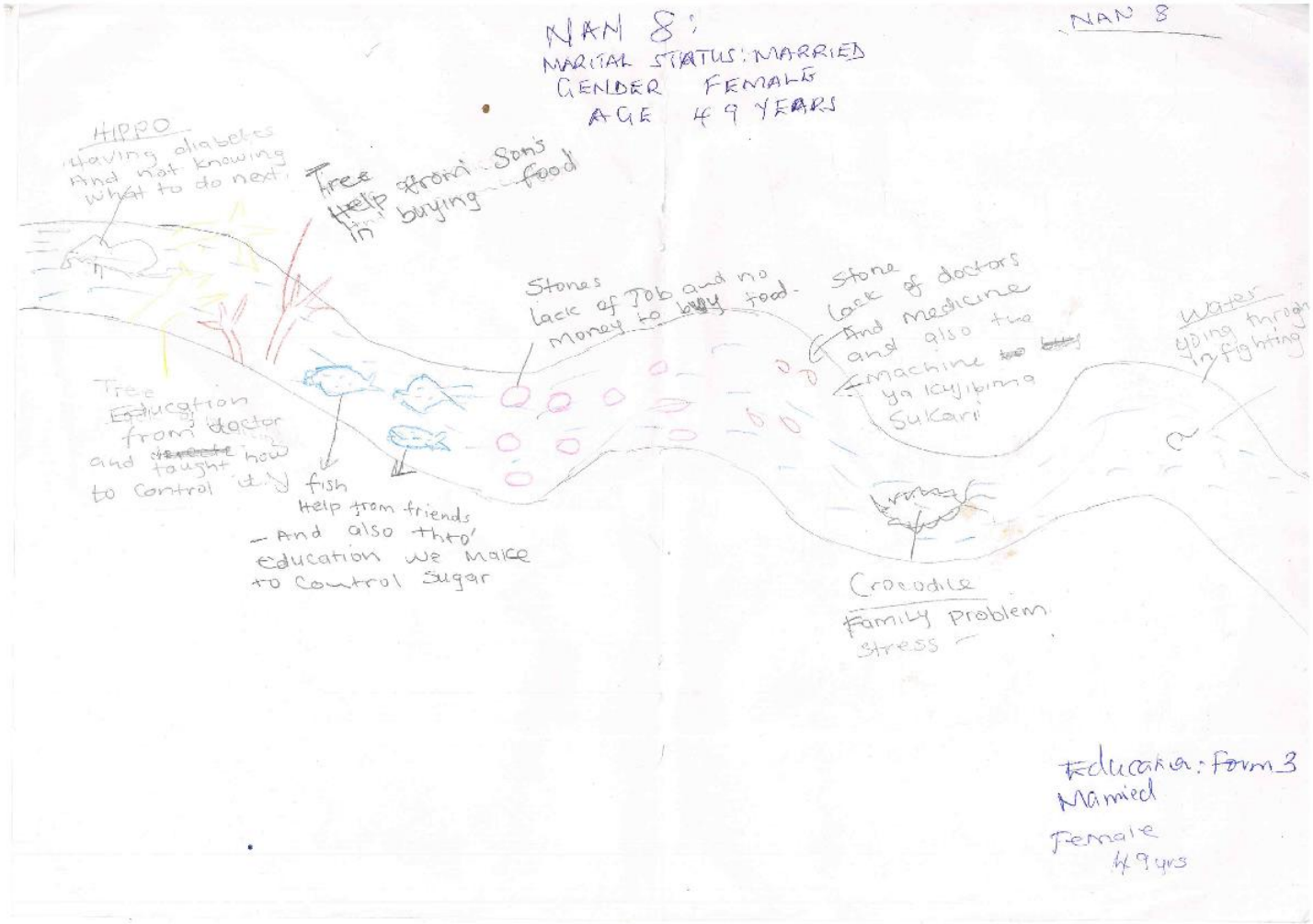
Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
		(2g) Physical state/systemic illness Of concern is the high proportion of patients who reported blurred vision and numbness of fingers and toes. Blurred vision may also be due to a need for corrective lenses to correct normal eye changes as a person ages. However, few patients were unable to afford eyeglasses or an appointment to have a dilated eye examination. (2d) Socio-economic status Blurred vision may also be due to a need for corrective lenses to correct normal eye changes as a person ages. However, most patients are unable to afford eyeglasses or an					diabetes education. (7e) Diabetes education, awareness and health promotion Furthermore, health care providers have no or very limited printed educational materials to give to patients. (7e) Diabetes education, awareness and health promotion More patients reported being able to identify symptoms of high blood glucose than low blood glucose; yet, the most frequently identified symptom for either condition was fatigue/weakness (7e) Diabetes education, awareness and health promotion

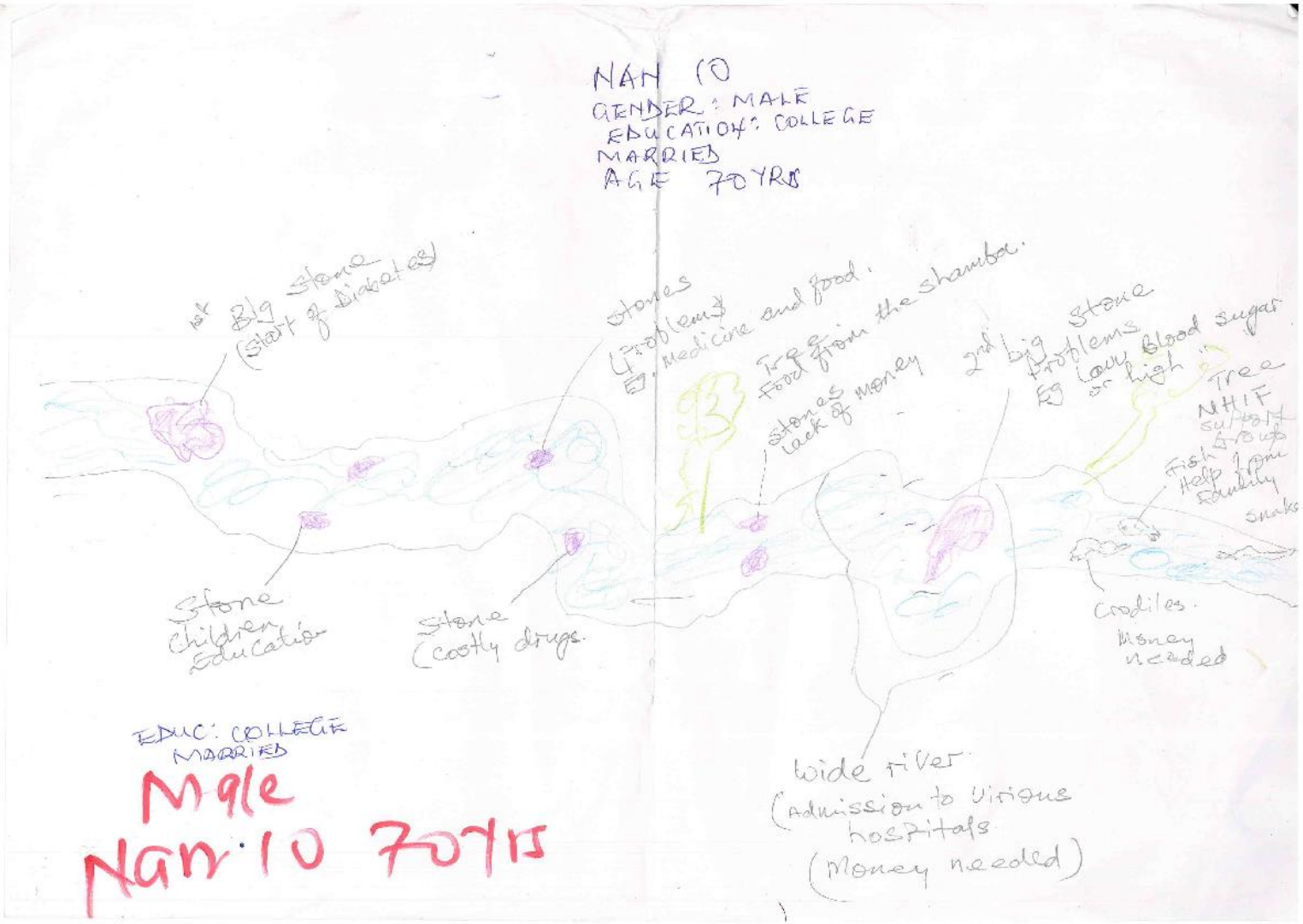
Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
		appointment to have a dilated eye examination (2d) Socio-economic status The major barrier was economic; few patients could afford to consistently take drugs, the cost of transportation to clinics for regular visits, or the cost of laboratory tests associated with diabetes care. (2g) Physical state/systemic illness The high reports of symptoms of neuropathy suggest late diagnosis of diabetes.					Patient education should incorporate the idea that not all illnesses have reliable symptoms, that optimal control of diabetes requires monitoring metabolic control using A1C or blood glucose measures, and that medication controls, not cures, the condition. (7b) Peer support groups/interventions Active peer support might be useful in helping a person with diabetes feel less isolated. (7h) Cost/infra-structure for interventions Uganda's health care system currently lacks the basic resources for appropriate treatment and

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
							management for the growing numbers of persons with type 2 diabetes..
Niazi, M. & Rafique, R. (2017) 'Patient-physician trust, emotional distress, and self-care activities of adults with type 2 diabetes mellitus'. *Pakistan Journal of Psychological Research*, 32(1), pp. 213–230. Record 157 (657) <u>Summary</u> Aim: To identify the mediating role of diabetes-related emotional distress on patient-physician trust and self-care activities. Study area: Study design: Correlational research design. Study population: Adults diagnosed with diabetes recruited from hospitals. Data collection instruments: Interpersonal Physician Trust Scale, Problem Areas in Diabetes Questionnaire and Self-care Inventory.			<u>(3c) Self efficacy/ attitude toward self</u> Clear and thorough explanations about health and options related to treatment provided by physician might help patients achieve a greater sense of control, become more optimistic, and manage ambiguity.	<u>(4b) Emotional influences</u> Hence, the study makes an important effort to emphasise the significance of patients' trust in their physician as an imperative factor for enhancing health-related outcomes such as self-care activities through diabetes-related emotional distress. Findings of the study indicate that physicians should pay more attention to psychological factors, such as diabetes-related emotional distress, when addressing self-care activities of			<u>(7i) Health care provider/patient interaction</u> Analyses reveal a significant positive relationship between patient–physician trust and self-care activities (r =.21, p=<.01), indicating that the those who have a higher level of trust in their physician, practice more of the self-care activities required for type 2 diabetes. These results indicate that participants who report high levels of trust in their physicians experience less diabetes-related emotional distress.

Article Ref.	Culture	Demographics	Attitude	Personality/mood /emotion	Indiv. Diff.	Exposure to media	Exposure to interventions
				adults with type 2 diabetes,			<u>(7e) Diabetes education, awareness and health promotion</u> The main task of physicians is to educate the patient, so that the patient has knowledge about the nature of diabetes and its symptoms, risk of complications, goals of the treatment, significance of regular exercise, physical activity, food intake, insulin, oral hypoglycemic medicines, and other drugs. <u>(7i) Health care provider/patient interaction</u> Communication between the patient and physician boosts a patient's self-efficacy, confidence, and trust in their physician.

ADDENDUM 11: EXTRACT OF SWAHILI-ENGLISH KAWA GROUP DISCUSSION TRANSCRIPT




NAN 10
GENDER: MALE
EDUCATION: COLLEGE
MARRIED
AGE 70YRS
1st Big Stone
(start of Diabetes)
Stones
(problems)
Eg. Medicine and food.
Tree
Food from the shamba.
stone as
lack of money
2nd Big Stone
Problems
Eg Low Blood sugars
or high
Tree
NHIF
support
groups
Fish
Help from
family
snacks
Stone
Children
Education
Stone
(costly drugs.
Crodiles.
Money
needed
wide river
(admission to various
hospitals
(Money needed)
EDUC: COLLEGE
MARRIED
Male
NAN 10 70YRS

ADDENDUM 12: EXTRACT OF SWAHILI-ENGLISH KAWA GROUP DISCUSSION TRANSCRIPT

EO	NAN 8: Please explain to us the things that are in your river. May be you could be having something that others have not talked about? Mimi ombi langu ni utuelezee vitu vilivyo kwenye mto wako. Labda unaweza kuwa na jiwe ama kitu ambacho wengine hawajaogea kuhusu?
NAN 8	I will start with the first item, which is a hippo. Kwanza ninaanza na la kwanza hapa, hii ni kiboko
EO	What does it represent? Hii ndio inawakilisha nini?
NAN 8	The hippo represents the moment I was diagnosed to have diabetes Hii inawakilisha ule wakati nilibainika kuwa na ugonjwa a kisukari
EO	Mmh Mmh
NAN 8	The tree represents the help I receive from my children and the help I receive from the doctors, who taught me what I would be doing so that I control my blood sugar.

	The third one is a fish, that one has been mentioned. Nina ingine moja hapa, huu mti, hio ni usaidizi kutoka kwa watoto wangu, halafu pia usaidizi kutoka kwa madaktari kwa sababu walinifunza ni nini ningekuwa nikifanya hivyo ili nidhibiti sukari yangu. Ya tatu ambayo ni ya samaki, hio tayari imetajwa.
EO	But what does your fish represent? Lakini samaki wako anawakilisha nini?
NAN 8	My fish represents the help I get from friends and from the doctors because they teach us how we shall be controlling our sugar levels. This other stone shows a lack of job and money to buy food as well as medicine. This is another stone, and many stones, which represent lack of doctors, medicine and the machine for measuring sugar. This other thing I drew in my river is a crocodile. The crocodile illustrates family problems I encounter. I have many problems from the family that stress me up. And when you get stress sugar goes up. The water in my river shows how we are struggling with this issues. Samaki wangu anawakilisha ule usaidizi ambao ninapata kutoka kwa marafiki na kwa madaktari kwa kuwa wanatufunza jinsi ambavyo tutakua tukidhibiti sukari yetu. Jiwe lingine ni ukosefu wa kazi, hakuna pesa za kununua chakula na pia dawa. Hili ni jiwe, mawe, ukosefu wa madaktari na dawa na pia mashine ya kupima sukari. Hili lingine ni mamba, shida za familia mtu anapata shida

	nyingi kutoka kwa familia hadi unapata stress. Na unapopata STRESS sukari inapanda. Na maji inaonyesha vile tunajitahidi na haya maswala.
EO	Thank you Asante
EO	NAN 10: Tell us about your river Tuambie kuhusu mto wako
NAN 10	As for me my river looks like it was flowing very well, but I came to the first stone, very big one, This is the time I was diagnosed with diabetes, and I was much younger that time Kwa maono yangu naona kuwa mto wangu ulikuwa unatiririka vizuri sana, lakini nilifikia kwa jiwe la kwanza, kubwa sana, huu ndio ule wakati nilibainika kuwa na ugonjwa wa kisukari, na nilikuwa mdogo kiumri wakati huo
EO	How old were you? Ulikuwa na miaka ngapi?
NAN 10	This is about thirty something years because it was in 1987, a long time, I was not old as I'm now. There i had a problem, there were the small stones here and there, like this other small stone my children were young and they were in school, the others were joining university, those small problems represented by small stones along the river became many. There is this other small stone which indicates the drugs I use, because from that time I was put on drugs. These drugs were affecting me in a way, because drugs are costly.

	Eeehh, as you can see I have drawn stones in progress, then next there is a big tree on the river that is flowing. There is that first tree which shows the help I get from my farm and my family, like food vegetables and those other things, I get food from my farm that is why I'm saying that I'm supported. And coming to this other point I find my river has another big stone that is about to block the river, making the river to expand a lot. That was a time when I had several hospital admissions, and It caused me lots of problems Hii ni kitu miaka thelathini na kitu, kwa sababu ilikuwa mwaka wa 1987, kitambo sikuwa mzee kama nilivyo sasa hivi. Hapo tulikuwa na shida, kulikuwa na mawe mengine madogo hapa na pale, kama hii jiwe dogo lingine watoto walikuwa wanaenda shule, wale wengine walikuwa wanajiunga na vyuo vikuu, hizo shida ndogo za mawe madogo kwenye mto yakawa mengi. Kuna hili jiwe lingine dogo dawa ninazotumia, kwa sababu kutoka wakati huo nimekua nikitumia dawa. Hizi dawa zilikuwa zikiathiri mahali pengine kwa kuwa hizi dawa zilikuwa bei ghali. Eeehh, na unapoona ni vile ni vile tu nimeonyesha mawe ikiendelea, halafu nikakuja hapa kuna mti mkubwa au kwenye mto ambao unatiririka kuna huo mti wa kwanza ni usaidizi napata kutoka kwa shamba langu na familia yangu, kama chakula, mboga na hizo vitu zingine, Napata kutoka kwa shamba langu ndio nasema ni….mimi nasaidiwa upande mmoja au mwingine kwa sababu sijafungiwa mbali. Na nikikuja kwa swala hili lingine napata mto wangu una jiwe linguine ambalo ni mkubwa hadi linazuia, Ilikuwa karibu kuzuia mto, hata ilifanya mto kupanuka kabisa. Huu ni wakati mwingine ambao mimi MWENYEWE nilikua nimelazwa katika hospitali mbalimbali, hio husababisha shida kubwa
EO	Were you admitted because of diabetes?

	Wewe ulilazwa kwa sababu ya shida ya ugonjwa wa kisukari?
NAN 10	Yah, because of sugar I was I was admitted in various hospitals and I spent a lot of oney. Ok, when I try to intervene the river begins to become good again, although the river continues to be rough, but there is another very big good tree, that is the help I get from my family and NHIF. NHIF pays for us consultation and drugs when they are available in the hospital. AS the river flows, problems become more and more. The river has crocodiles as well as snakes, which represent problems that are centered on money. Due to lack of money, blood sugar continues to increase and my river becomes narrow and narrow because managing diabetes is costly. Ndio, Kwa sababu ya sukari mimi nililazwa katika hospitali mbalimbali na pesa nyingi inatumika. Sawa, wakati ninajaribu kuingilia mto unaanza kuwa mzuri tena, ingawa mto huendelea kua mbaya, lakini pia kuna mti mwingine mkubwa sana, hiyo ni ile usaidizi napata kutoka kwa familia yangu na kitu kama NHIF, inatulipia pesa za clinic na dawa wakati zinapatikana, hio ndio maana Napata usaidizi kutoka upande mwingine. Kulingana na vile mto unavyotiririka, basi shida zinaendelea kuwa nyingi zaidi, mto una mamba na hata nyoka wako pale, hizo ndizo shida na hasa tukiangalia upande wa pesa. Kwa sababu ya pesa hio ndio maana hii sukari huwa….kwa sababu vile tunaendelea na inaendelea kukuwa nyembamba sasa kwa sababu shida znaendelea kuwa nyingi, kwa sukari inaendelea kuwa bei ghali
EO	Thank you Asanti

ADDENDUM 13: SELECTED ARTICLES FOR THE SCOPING REVIEW

Articles (n=9) selected for scoping review, with extracted categories and subcategories

Article	Categories referenced in each article	Subcategories that emerged from each category
Baumann, J. L., Opio, C. K., Otim, M., Olson, L. and Ellison, S. (2017). 'Self-care beliefs and behaviors in Ugandan adults with Type 2 diabetes', *The Diabetes Educator*, 20(10), pp. 1–9. https://doi.org/10.1177/0145721709358460	Culture	Values/norms/cultural beliefs Lifestyle Environmental factors Language
	Demographics	Age Gender Education Socioeconomic status Family history of diabetes Physical state/systemic illness Duration of illness
	Attitude	Attitude/perception towards diabetes/DSM Stigma Self-efficacy/attitude towards self
	Personality/mood/ emotion	Emotional influences
	Individual differences	Perceived risk/barrier/ challenges
	Exposure to interventions	Peer support groups or peer interventions Family/social support Diabetes education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-

Article	Categories referenced in each article	Subcategories that emerged from each category
		monitoring of blood glucose medication adherence) Treatment modalities (regimen) Cost/infrastructure for interventions Health care provider/patient interaction
Baumann, L. C., Nakwagala, F., Nankwanga B., Ejang J. and Nambuya A. (2015). 'A demonstration of peer support for Ugandan adults with Type 2 diabetes'. *International Journal of Behavioral Medicine*, 22, pp. 374–383. https://doi.org/10.1007/s12529-014-9412-8	Culture	Lifestyle Language
	Demographics	Education Socioeconomic status Physical state/systemic illness
	Attitude	Mental illness comorbidity Emotional influences
	Individual differences	Perceived risk/barrier/ challenges
	Exposure to media	Mass media, e.g., radio, television, mobile phone apps.
	Exposure to interventions	Peer support groups or peer interventions Self-care resources, e.g., glucometer and strips Diabetes education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-monitoring of blood glucose medication adherence) Treatment modalities (regimen) Cost/infrastructure for interventions Health care provider/patient interaction

Article	Categories referenced in each article	Subcategories that emerged from each category
Bhandari, P. and Kim, M. (2016). 'Self-care behaviors of Nepalese adults with Type 2 diabetes', *Nursing Research*, 65(3), pp. 202–214. https://doi.org/10.1097/NNR.0000000000000153	Culture	Religion/religious practices Lifestyle
	Demographics	Age Socioeconomic status Physical state/systemic illness Duration of illness
	Attitude	Attitude towards diabetes/DSM
	Personality/mood/emotion	Emotional influences
	Individual differences	Perceived risks/barriers/ challenges
	Exposure to interventions	Peer support groups or peer interventions Family/social support Diabetes education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-monitoring of blood glucose medication adherence)
Fisher, E. B., Boothroyd, R. I., Coufal, M. M., Baumann, L., Mbanya, J. C., Rotheram-Borus, M. J., Sanguanprasit, B. and Tanasugarn, C. (2014). 'Peer support for self-management of diabetes improved outcomes in international settings', NIH Public Access, 31(1), pp. 130–139. https://doi.org/10.1377/hlthaff.2011.0914.Peer	Culture	Religion/religious practices Values/norms/cultural beliefs Language
	Demographics	Physical state/systemic illness
	Attitude	Attitude/perception related to diabetes/DSM
	Personality/mood/ emotion	Mental illness comorbidities Emotional influences
	Personal differences	Perceived benefit/enabler

Article	Categories referenced in each article	Subcategories that emerged from each category
	Exposure to media	Mass media/social media/mobile phone apps
	Exposure to interventions	Peer support groups or peer interventions Family/social support Diabetic education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-monitoring of blood glucose medication adherence) Cost/infrastructure for interventions Health care provider/patient interaction
Gurmu, Y., Gela, D. and Aga, F. (2018). 'Factors associated with self-care practice among adult diabetes patients in West Shoa Zone, Oromia Regional State, Ethiopia', *BMC Health Services Research*, 18(732), pp. 1–9. https//doi.org/10.1186/s12913-018-3448-4	Culture	Religion/religious activities
	Demographics	Age Gender Education Marital status Duration of illness (time)
	Attitude	Self-efficacy/attitude towards self
	Exposure to interventions	Family/social support Self-care resources e. g glucometer and strips Diabetic education, awareness and health promotion Performing recommended self-care practice (Diet, physical activity, foot care, self-monitoring of blood glucose medication adherence)

Article	Categories referenced in each article	Subcategories that emerged from each category
		Treatment modalities (regimen)
Mariye, T., Tasew, H., Teklay, G., Gerensea, H. and Daba, W. (2018). 'Magnitude of diabetes self-care practice and associated factors among Type Two adult diabetic patients following at public hospitals in central zone, Tigray Region, Ethiopia, 2017'. *BMC Research Notes,* 11(380), pp. 1–6. https://doi.org/10.1186/s13104-018-3489-0	Culture	Values, norms and cultural beliefs Lifestyle
	Demographics	Gender Socioeconomic status Family history of diabetes
	Attitude	Attitudes towards diabetes or DSM
	Personality/mood/ emotions	Emotional influences
	Individual differences	Perceived benefits/enabler
	Exposure to interventions	Peer support groups or peer interventions Self-care resources, e. g., glucometer and strips Diabetes education, awareness and health promotion
Mohandas, A., S. K. Bhasin, S. K., Upadhyay, M. and Madhu, S. V. (2018). 'Diabetes self care activities among adults 20 years and above residing in a resettlement colony in East Delhi'. *Indian Journal of Public Health*, 62(2), pp. 103–110. https://doi.org/:10.4103/ijph.IJPH	Culture	Religion/religious practices Values, norms and cultural beliefs Lifestyle
	Demographics	Age Gender Education Socioeconomic status Physical state/systemic illness
	Personality/mood/ emotion	Mental illness/ comorbidities Emotional influences

Article	Categories referenced in each article	Subcategories that emerged from each category
	Exposure to interventions	Family/social support Diabetes education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-monitoring of blood glucose medication adherence) Treatment modalities (regimen)
Niazi, M. and Rafique, R. (2017) 'Patient-physician trust, emotional distress, and self-care activities of adults with Type II diabetes mellitus', *Pakistan Journal of Psychological Research*, 32(1), pp. 213–230.	Culture	Self-efficacy/attitude towards self
	Personality/mood/ emotion	Emotional influences
	Exposure to interventions	Diabetes education, awareness and health promotion Health care provider/patient interaction
Wabe, N. T., Angamo, M. T. and Hussein, S. (2011). 'Medication adherence in diabetes mellitus and self management practices among Type-2 diabetics in Ethiopia'. *North American Journal of Medical Sciences,* 3(9), pp. 5–10. https://doi.org/10.4297/najms.2011.3418	Culture	Lifestyle
	Demographics	Age Gender Socioeconomic status Physical state/systemic illness
	Personality/mood/ emotion	Emotional influences
	Individual differences	Perceived risk/barrier/ challenges
	Exposure to interventions	Diabetes education, awareness and health promotion Performing recommended self-care practice (diet, physical activity, foot care, self-monitoring of blood glucose medication adherence)

Article	Categories referenced in each article	Subcategories that emerged from each category
		Treatment modalities (regimen) Cost/infrastructure for interventions Health care provider/patient interaction

ADDENDUM 14: SURVEY QUESTIONNAIRRE

Enabling adult diabetes self-management in a Kenyan context: A design science research approach.

Researcher's contact details:
Name: Esther Opisa
Telephone No: +254724729453
Email: asenahabiesther@gmail.com
PhD in Nursing, University of Free State, South Africa.

Instructions to the participant on how to complete the questionnaire

1. Do not indicate your name/mobile number or any other identifying data on the questionnaire
2. Before completing the questionnaire, we ask that you sign the informed consent provided.
3. The questionnaire has four sections namely demographic data, information to be included in the product, format of the product and procedure of using the product. Please provide your responses to all questions in these sections.
4. Indicate your response by ticking in the provided space.
5. Once you have completed the questionnaire, kindly place it in a sealed post box in the manager's office.

Enabling adult diabetes self-management in a Kenyan context: A design science research approach.

Date the questionnaire is completed ……/……/……. (day/month/year)

Name of the hospital……

Kakamega-K

Nanyuki-NAN

Code ……

Section 1: Demographics

1.1 Which of the following professional disciplines do you belong to? **Mark all appropriate**.
Indicate your response by ticking against the appropriate choice(s) in the column provided next to the professional discipline.

Professional discipline	**Response**
1 Nurse	
2 Medical doctor	
3 Clinical officer	
4 Nutritionist/dietician	
5 Pharmacist	
6 Pharmacy technologist	

7Counsellor	
8 Diabetes educator	

1.2 What is your work station?
*Indicate your response by ticking against your appropriate work station(s) in the column provided**. Mark all appropriate.***

Work station	**Response**
1 Medical/surgical in patient ward	
2 Out-patient diabetes clinic	
3 Emergency department	
4 Pharmacy	
5 Critical care unit	

6 Any other work station ……

1.3 How long have you been providing care to diabetic patients?
Indicate your response by ticking against the appropriate duration in the provided space. ***Only one box should be ticked.***

Duration of experience	**Response (Tick against one only)**
1) 1 to 5 years	
2) 6 to 10 years	
3) More than 10 years	

Section 2: Information to be included in a product that will enable diabetes self-management among adults in Kenya.

In this section of the questionnaire, there are two sub-sections. The first sub-section is an enquiry on the factors that influence diabetes self-management. The second sub-section enquires on the information that should be included in a product that will enable diabetes self-management among adults in Kenya.

2.1 Factors that influence adult diabetes self-management.

In this section of the questionnaire, the researcher is making an enquiry on the factors that influence adult diabetes self-management.

In your opinion, how strongly do the following factors influence adult diabetes self-management?

Indicate your response by ticking in the column that most appropriately represents your opinion. ***Only one column should be ticked.***

The following is a clarification of the scale used in answering this question.

- Strong influence – the factor is often seen to affect adult diabetes self-management; it has a strong impact on how well patients self-manage their condition.
- Moderate influence – the factor is sometimes seen to affect adult diabetes self-management; it has a moderate impact on how well adult patients self-manage their condition.
- No influence – the factor is almost never seen to influence adult diabetes self-management.

- I am not sure – the factor and/or its influence is not known to you.

Factors	Specific aspects of the factors influencing diabetes self-management	Strong influence (1)	Moderate influence (2)	No influence (3)	I'm not sure (4)
1)Cultural factors	1 Religion				
	2 Marital status				
	3 Cultural beliefs/values/norms				
	4 Lifestyle				
2)Demographics	1 Age				
	2 Gender				
	3 Education				
	4 Socio-economic status				
	5 Family history of diabetes				
	6 Physical state systemic illness				
3)Attitudes towards targets of diabetes self-management	1 Attitudes towards diabetes/diabetes self-management				
	2 Stigma				
	3 Confidence in one's own ability in diabetes self-management.				
4)Personality/mood/emotions	1 Mental illness comorbidity				
	2 Emotions				
5)Individual differences	1 Patient's perceived risks of diabetes/diabetes management				
	2 Perceived benefits of diabetes management				
6)Exposure to media	1 Exposure to social media				
	2 Exposure to mass media e. g radio, television, newspapers, internet, mobile phone applications.				
7)Exposure to interventions	1 Exposure to alternative medicine				
	2 Exposure to peer support groups/peer interventions				
	3 Family support				
	4 Self-care resources				
	5 Diabetic education, awareness and health promotion.				

Factors	Specific aspects of the factors influencing diabetes self-management	Strong influence (1)	Moderate influence (2)	No influence (3)	I'm not sure (4)
	6 Treatment options such as oral hypoglycemic agents, insulin therapy				
	7 Cost/ infrastructure for interventions				
	8 Patient/physician relationship.				

The following section of the questionnaire is concerned with the information that should be included in a diabetes self-management product for adults in Kenya.

2.2. In your opinion, how important is it to include the following information in a product that will enable diabetes self-management among adults in Kenya?

Indicate your response by ticking in column that most appropriately represents your opinion. ***Only one column should be ticked.***

The following is a clarification of the scale used in answering this question.

- Very important and essential: The information is very significant in enabling adult diabetes self-management and must be included in the product.
- Important but not essential: The information is significant in enabling adult diabetes self-management and may be included in the product.
- Would be nice to have: The information is not significant in enabling adult diabetes self-management but it may be included in the product.
- Not important nor essential: The information is not significant in enabling adult diabetes self-management and it should not be included in the product.

Variable	Information	Very important and essential (1)	Important but not essential (2)	Would be nice to have (3)	Not important nor essential (4)
1 Cultural beliefs/values/ norms	The product should have information that is aligned to cultural beliefs/values/norms of adults in Kenya.				
2 Dietary lifestyle modification	The product should have an education section on recommended dietary and lifestyle modifications.				

Variable	Information	Very important and essential (1)	Important but not essential (2)	Would be nice to have (3)	Not important nor essential (4)
3 Physical activity	The product should have an education section on recommended physical activity.				
4 Drug adherence	The product should have an education section on recommended drug adherence.				
5 Blood glucose monitoring	The product should have an education section on blood glucose monitoring				
6 Religion	The product should contain information that is aligned to religious beliefs and practices of adults in Kenya				
7 Age	The product should contain age appropriate information on diabetes self-management.				
8 Gender	The product should reflect information that is appropriate for male/female gender				
9 Education	The product should contain information that can be usable by all adults irrespective of their literacy level				
10 Duration of illness	The product should contain information that is applicable to newly diagnosed diabetic patients as well as diabetic patients who have lived with the diabetes for a longer duration				
11 Socio-economic factors	The product should contain information on approaches that can be used by diabetic patients to reduce the cost of self-management.				
12 Physical state/systemic illness	The product should contain information that shall put physical state of diabetic patients into consideration				

Variable	Information	Very important and essential (1)	Important but not essential (2)	Would be nice to have (3)	Not important nor essential (4)
13 Attitudes towards diabetes/diabetes self-management	1 The product should contain information that aims at enhancing favorable attitudes towards diabetes/diabetes management.				
	2 The product should aim at addressing negative attitudes/stigma towards diabetes/diabetes self-management				
14 Confidence in one's own ability for diabetes self-management	The product should have a section that can promote periodic evaluation of confidence in one's own ability for diabetes self-management				
15 Mental illness/comorbidities	1 The product should contain information on diabetes related mental illness/comorbidities.				
	2 The product should encourage adult diabetic patients to come up with innovative approaches of handling emotional concerns.				
16 Peer support	1 The product should contain information on how to form and run a peer support group.				
	2 The product should contain information on peer support activities				
	3 The product should contain information that will enable diabetic patients to support one another in stress management.				
17 Family/ social support	The product should contain information on how the family can support diabetes self-management.				
18 Support from health care providers	1 The product should contain information on support services that can be provided by health care providers.				
	2 The product should contain information on how diabetic				

Variable	Information	Very important and essential (1)	Important but not essential (2)	Would be nice to have (3)	Not important nor essential (4)
	patients can access emergency care.				
	3 The product should enhance interaction between diabetic patients and health care providers				
	4 The product should assist diabetic patients to reduce over-reliance on health care providers.				
19 Self-care resources	1 The product should contain information on the use of glucometer and strips.				
	2 The product should contain information on how to use insulin syringes.				
	3 The product should contain information on storage of insulin.				
	4 The product should outline cost effective ways of accessing self-care resources.				
20 Treatment modalities	1 The product should contain information on participatory role of the patient in treatment planning.				
	2 The product should contain information on complications that arise from non-compliance to diabetes self-management practices.				

21 From your experience, what other information is important in a product that will enable DSM in Kenya?

……
……
……
……

Section 3: The format of a product that will enable DSM among adults in Kenya.

This section of the questionnaire has two sections. The first section deals with the details of the format of the product while the second section enquires on the most effective format of the product that will enable diabetes self-management among adults in Kenya.

3.1 From your experience, how essential are the following statements on the details of the format of a product that will enable DSM among adults in Kenya?

Indicate your response by ticking in column that most appropriately represents your experience. ***Only one column should be ticked.***

You are requested to follow this scale to choose your responses.

- Very essential: The details are very important and must be included in the product.
- Nice to have: The details can be included in the product but they are not important.
- Not essential: The details are not important and should not be included in the product

Statement on details of the product	**Very essential (1)**	**Nice to have (2)**	**Not essential (3)**
1 The product should have a cover page with provision of patient's personal details.			
2 The product should enhance active use by providing space for the patient to document parameters such as physical activities, blood glucose levels, meals taken, blood pressure.			
3 The product should have clear instructions on how to use the different product sections.			
4 The product should be presented in appropriate languages acceptable to diabetic patients (English, Swahili, native languages)			
5 The product should not increase the cost of diabetes self-management.			
6 The product should be simplified to enable family members use it when supporting diabetic patients in self-care.			
7 The product should contain illustrations of using self-care resources.			
8 The product should have illustrations of food portions.			
9 The product should contain written information using simple terminologies that patients can understand.			
10The product should be designed to allow periodic review and improvement of information, format and procedure of its (the product) use.			

3.2 In your opinion, what is the most effective format of a product that can enhance self-care among diabetic patients?

Please select your response based on the following scale:

- Most effective- the format is highly acceptable and highly usable by adult diabetic patients.
- Effective- the format is moderately acceptable and moderately usable by adult diabetic patients.
- Not effective- the format is not acceptable and minimally used by adults with diabetes.
- I'm not sure- the format and its usability is not known to you.

Indicate your response by ticking in column that most appropriately represents your opinion. ***Only one column should be ticked.***

Format	**Statement on the users of the format**	**Most effective (1)**	**Effective (2)**	**Not effective (3)**	**I'm not sure (4)**
1 Charts	1 The charts to be exclusively used by the patient				
	2 Charts to be used jointly by the patients and health care provider				
	3 Charts to be exclusively used by health care providers				
2 Pamphlet	1 Pamphlets to be exclusively used by the patient.				
	2 Pamphlets to be used jointly by the patients and health care provider				
	3 Pamphlets to be exclusively used by health care providers.				
3Videos/video clips	1 Videos/video clips to be exclusively used by the patient.				
	2 Videos/video clips to be used jointly by the patients and health care provider.				
	3 Videos/video clips to be exclusively used by health care providers.				
4 Mobile phone applications	1 Mobile phone application to be used exclusively by the patients.				
	2 Mobile phone applications to be used jointly by the patients and health care provider.				

Format	Statement on the users of the format	Most effective (1)	Effective (2)	Not effective (3)	I'm not sure (4)
	3 Mobile phone applications.to be used exclusively by health care providers.				
5 Work ook	1 Workbook to be used exclusively by the patients				
	2 Workbook to be used jointly by the patients and health care providers				
	3 Workbook to be used exclusively by health care providers.				
6 Manual	1 Manual to be used exclusively by the patients				
	2 Manual to be used jointly by the patients and health care providers.				
	3 Manual to be used exclusively by health care providers.				
7 Oral transfer of knowledge	1 Oral transfer of knowledge to be used exclusively by the patient				
	2 Oral transfer of knowledge to be used jointly by patients and health care providers.				
	3 Oral transfer of knowledge to be used exclusively by health care providers.				

Section 4: The mode of use of the product that will enable diabetes self-management among adults in Kenya.

This last section of the questionnaire concerns how the product will be used to enable diabetes self-management among adults in Kenya.

4.1 From your experience and opinion, to what extend do you agree to the following statements on the mode of use of a product that will enable diabetes self-management among adults in Kenya?

The following is an explanation of the scale used in this question.

- Strongly agree- This refers to the highly acceptable mode of use of the product.

- Agree- This refers to the moderately acceptable mode of use of the product.
- Disagree- This is the least or never acceptable mode of use.

Indicate your response by ticking in the most appropriate column for each statement. ***Tick in only one column for each statement.***

Statement	**Strongly agree (1)**	**Agree (2)**	**Disagree (3)**
1 The product should be usable by the patient on their own.			
2 The product should be used by diabetic patients during peer support group sessions.			
3 The product should be partly endorsed in the places of worship by spiritual authorities.			
4 The product should be easily accessed by the diabetic patients.			
5 The product should be kept in a format that will not be easily altered by users or any other individuals.			
6 The product shall only be reproduced with the approval of the author(s).			
7 The product should support interactions among diabetic patients.			
8 The product could be made available on commonly used social media platforms.			
9 The product could be circulated through mass media (radio, television, newspapers)			
10 The product should be used to support peer support activities			
11 The product should undergo periodic review of its content and usability.			

12 Other suggestions

……
……
……
……

THANK YOU FOR PARTICIPATING IN THIS SURVEY

_____END_____

ADDENDUM 15: DSM ENABLERS CATEGORIES, CODES, CORRESPONDING PARTICIPANT QUOTES AND METAPHORS

What things hinder or enable you to take care of yourself?

Theme 1: Enablers of DSM

Presentation of data categories, codes, and participant quotes that form theme 1

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
a. Economic determi-nants of DSM	v) NHIF helps me finance my diabetes manage-ment	This is help. NHIF helps me a to pay for my drugs and clinic fee	Trees	K1
		Mhhhh, water is flowing well because I'm using NHIF that helps me to pay for the diabetic clinic	Water is flowing well That is why you can see this river does not have a lot of things	K3
		From there I think it started becoming a little bit better because of the clinic that belongs to the government, getting some advice, and NHIF coming in on hospital issues and especially the clinic like this one	So things have started becoming better	NAN7
		That is the help I get from my family and something like NHIF, It pays for us consultation and drugs when they are available in the hospital	There is another very big good tree	NAN10
		Yes, I was admitted in hospital, and I spent over 200 000 shillings, and who paid all		NAN5

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		that? NHIF, isn't that a great support? Now I'm on dialysis, I go twice a week, twice a week is 19 000 shillings, I don't pay, it is paid by NHIF. Imagine in a whole year how much money is that? So it is very, very important and people should not see this as a joke		
		I started being assisted by NHIF on issues of drugs. Now sugar is reducing slowly by slowly because of being assisted by NHIF		NAN11
		My husband registered me in NHIF so now when I go to pick drugs I get the drugs. I only buy like one type only. The participant buys the drug that could be unavailable in the hospital pharmacy.		NAN14
		If it is drugs we take them under NHIF		NAN15
		Assistance, like NHIF usually helps a lot to pay for drugs and the clinic	There are trees	NAN16
		Then I was told NHIF can assist So I crossed from here to the other side ahead, that is NHIF help	You see this one? It is … let's say a place of crossing over	NAN21
		Now, my husband joined NHIF, now I was put there also. And it helped me to reduce the cost of treatment		NAN24

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		Participant was included in her husband's NHIF cover.		
		But if someone has NHIF, here in hospital there is no paying for anything, and NHIF is only 500 shillings per month This participant acknowledges that NHIF pays for all costs incurred during a visit to hospital and the premium of KSh 500 Is affordable to them.		NAN26
		It is NHIF. It usually helps us a little to get some drugs	You see this other small tree here?	NAN27
		500 shillings is very little money per month to pay for NHIF		NAN13
		And that information I will follow up so that if they agree to register me I see if will reduce the cost I will try my best I be registered The participant desires to seek NHIF premium payment support from the county government.		NAN23
		I was told that there is a clinic here, and if someone has NHIF card it pays for her/him		NAN22
b. Dietary factors influencing DSM	ii) Healthy food choices improve nutritional	I eat fruits and vegetables in my diet		K1
		And also I'm really trying to eat the food that I have been taught by the doctors in the		NAN22

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
	status of people with diabetes	clinic to control my sugar levels		
		You know we are told to eat meat like fish or … like chicken. So I try to look for food that we are told by the doctors.	This is fish	NAN24
		Also *chapatti* when I get money even bread I buy the brown one But the white one (*chapatti*) when I eat sugar is full in my mouth		K2
		You are supposed to use finger millet that has no sugar	I have drawn …fish. This means getting and using proper food	K3
		Fish I use it for my health, because that, I use it to eat as food. Because fish is meat, food		NAN5
	iii) Availability of food enables compliance to recommend ed diet	I get food from my farm, my wife does farming	Fish Now this water is moving ahead	NAN5
		We plant maize, beans, vegetables. That is food I get a little from my farm	This I have drawn is like some plants?	K2
		Another thing I plant maize, cassava, and bananas. This food helps me And also I plant trees like avocado, pawpaw in my farm to get enough fruits in my diet		K3

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		Those plants at times there are some I can use for vegetables, or like food	Plants	NAN5
		Food, vegetables and those other things, I'm getting from my farm that is why I'm saying that is … I'm helped on one side or another because I'm not tied off The participant states that he always has food, because he can get it from his farm.	Trees	NAN10
		These trees is the food I get from my farm When I get food from my farm I get food properly	And here now on the side of the river I have drawn this, trees This is a fish	NAN2
		And also I have a farm where I plant food that helps me to have enough food		NAN13
		And if it is food we get a bit from the farm, and the rest we buy from the market		NAN15
		I plant vegetables in my farm	Because here at the side of my river I have drawn these trees	NAN22
		The food I have planted at my farm it helps me with food. When I don't have money I can look for food in my farm	These are plants	NAN24
		Farming helps us a lot to get food	I have drawn this tree	NAN25
		This time my river was good before I became sick I used to keep cows, even dairy cows	Cows	NAN25

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		… and I used to sell milk, and get money to buy other foods		
		Trees is to say we can get food like fruits from the trees, they take up water and prevent the river from dying	Trees	NAN28
c. Support structures in DSM	Family/ social support plays a key role in self-care	Transport, my youngest daughter helps me a lot to get transport to hospital	Trees	K1
		The children bring some little money it reduces stress I haven't taken NHIF yet, but my child is making plans I get it [NHIF] very soon, I will have it	My river at times it goes up at times it comes down, now it is flowing well	K2
		From there we started flowing well because she understood and also the children were helping her to prepare recommended meals The participant acknowledges that his wife and children adjusted and are able to prepare the recommended diet.	From there we started flowing well	NAN7
		I found those small trees supporting me, and that is my children who started funding me with money to buy medicine	Those little trees	NAN6
		That is help from the children. The children bring some little money I buy food and it reduces stress	Here now stones are reducing They become small sizes	K2
		That is assistance from my children, they give me some	Fish	NAN8

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		money to buy medicine and food		
		There is that first tree it is the help I get from my farm and my family That is the help I get from my family	There is a big tree on the river that is flowing but there is another very big good tree	NAN10
		And then here it was that my second-born daughter started working, so she was helping me and at times you find when I'm sent money by my children I manage to buy drugs	That is why I say it is a fish And other trees in the river	NAN3
		My neighbours, they constructed for me a house, then I moved on and on		NAN11
		My family usually assists me to buy medicine		NAN13
		And other times the family supports Ehhh, they do for her the things she cannot do	Trees	NAN16 (Inform-ant)
		Trees help, like supporting, so that I don't fall. Like my husband died but my children they help me to get money for buying food and medicine	Trees	NAN21
		And my mother is teaching me how to tackle this problem of diabetes		NAN22
		The child … ehhhhe, you know it is my daughter second-born. This child helps me a lot. She helps me talking to me, she tells me Mam don't die with stress when her	A person who is next to a tree	NAN24

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		father becomes harsh to me, she brings me to the clinic sometimes, when I have stress she is the one who talks to me This one it is like God knew and gave me, right now even she was calling me, she is asking if I have finished because she has brought me tea, she tells me, don't drop because of hunger. Now she has been of great help to me		
		It means, the way my husband has helped me he has stood with me, when I'm worried he tells me not to be worried because life will continue, he helps me even in buying drugs. He has understood me completely	This is now very nice trees that have grown here at the riverbanks That is why you see here, my river is going on well	NAN27
		Here I cleared for them *[her children]* their education and now things are fine		NAN11
		Where I stay there is no problem, unless you go to look for problems from neighbours		K2
		If it is machine maybe I get, I mean through the children or through my own resources		NAN7
		Also because this problem affecting everyday living it is good for our wives or husbands or our family members should be involved in education sessions together with us as patients		NAN4

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		That is true, instead of us learning alone, it is better for me to have someone from my family so that they can know how to help us		NAN7
		Yes, doctors should emphasise on that (educating family members), yes, yes, it is true		Group consensus
	Peer support enhances DSM	Now at home in Makunga, those doctors told us to start joining together when we have sugar problems		K1
		After buying drugs I joined this group		NAN7
		Groups? There are people who have joined I will to join The participant is willing to join peer support group.		NAN18
		Yes, some of us we are in a group that meets here in the hospital chapel		NAN13
		I know we always attend the groups with NAN 13, NAN 11, NAN 12, NAN 15 and NAN 16 When we meet we check our sugars, blood pressure and if someone has a question we try to help him		NAN14
		We used to meet there at my home because it is near the market When this disease is over we shall continue to meet		K1

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		I know there is a support group here at the hospital, they meet every second Thursday of the month		NAN17
		Yes it is good I can try to approach the group and join them		NAN19
		We usually measure each other's' blood glucose		K1
		It helped me with a lot of counselling and how I can eat properly so that I can balance my sugar		NAN6
		If we get some more funding it can be easy If we get more funding maybe we shall see what else we can do Participant suggests that if the group can access more funding then they (the group) could expand the scope of DSM activities they perform as a group.		K1
		These trees at the sides, you know it helps the river … when the river has these trees, these trees help, we are supposed to see what will help us so that Corona does not finish us. The participant means that people with diabetes should find solutions in form of support structures to help them handle challenges such as covid 19	These trees at the sides, you know it helps the river ….	NAN25

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
	Support from hospital/ health care providers enhances DSM	I have drawn, is called place to cross the river, like a bridge, that is doctors here in the clinic and God It is just God, so that life moves on doctors and God to intervene and help us so that we are not finished	… a place to cross the river, like a bridge	NAN26
		Now in the clinic they teach checking blood sugar often	A tree beside the water. Because them they are not inside the river or my life. Clinic is like this	K3
		I have been helped by the doctors who have counselled me on the problem with my wife.	Now I can see my river is flowing well	NAN6
		When we come here in the clinic I'm assisted a lot to learn about food, that is why my sugar is good, because that doctor will teach me how to eat, and so my sugar is good	This other one is a small tree My river is flowing well, eehh	NAN1
		and then help from the doctors because they taught me what I would be doing so that I control my sugar level	Fish	NAN 8
		And then this fish is the time I started coming to the clinic, I was helped a lot, the doctor taught me how to eat then	I saw my journey becoming better	NAN9
		Then I was sent to the nutritionist, afterwards I was sent to the senior most doctor		NAN18

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		I was told to eat a lot of vegetables from there I continued taking a lot of water then I was told to come to the clinic after one month, then I was told to come after three months, I'm continuing until now		
		And also doctor's clinic, they taught me what I should eat, and giving me drugs	That is that crossing point	NAN21
		Now I started coming here, I found doctors who changed for me drugs and gave me cheaper drugs and those drugs started bringing sugar to normal state. Now my stress got finished	And my river became good.	NAN22
		Right ahead when I come to the clinic my water flows well These doctors help me a lot teaching us how I will take care of myself. That is why it *[river]* becomes better	My water flows well.	NAN24
		Doctors are good, they teach us and test us	But now this other one is a bridge.	NAN25
		And then I came to hospital and the doctors here taught me how to care for myself		NAN29
d. Emotio-nal influences affecting DSM	iv) Emotio-nal resilience and stress manageme	In our church we have teachings that help us not to have stress When I'm stressed up I sing or I go away from the person who is causing the stress		K2

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
	nt improves DSM	Because of prayers and NHIF, ehh, it helps me reduce stress and take care of myself.	Now reaching here it went smoothly on a slope	NAN12
		I was just praying, and encouraging myself, and that stress reduced, then we knew with my husband and my children how to solve the problems. My family also helped me and prayed for me		NAN14
		I use … if I have something disturbing me I have to see it is OK, then I will be fine. What I need I have to see it is ok or I have gotten it. The participant means that when she has an issue that is disturbing her psychologically she has to get a solution so that she can settle.		NAN18
		Yes I pray to God so that I can solve the stress		NAN18
		Me I get help from the church and God. When I pray I see that problem ….God just helps me I find a way	That is why you see this church I have drawn here	NAN25
		And I find myself looking for something to do like making *kiondoo* [traditional basket] and when I make the *kiondoo* I feel I have done something good. Also I go to the farm and I try digging. That is the work I do at home Yes, it reduces anger, and at times I untie my goat, and I graze it there, my chicken I feed them there, I look after them, I give them food that is		NAN 19

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		the work I do when I want to reduce anger		
		During such times when I have problems I usually pray or I put life to be free, so that I see if at least the sugar will come down Eehh, I reduce stress		NAN20
		Now it is absence of stress, you prevent yourself, and now the river flows well The participant states that when he has no stress, his river flows well.	The river flows well	NAN17
		I pray to God so that I reduce that stress		NAN18
		It was a big problem, but I had to accept I have that problem and I started attending clinic, which was private, not here This participant acknowledges that accepting her condition enabled her to start attending clinic.		NAN22
		When the storms become a lot I go to church to pray and that helps my mind to settle	That is a church	NAN24
		But we are pushing on with life. As we pray God to help us So I just encouraged myself, and prayed to God, that is why you see even if there was difficulty still the river is moving on but even here difficulty is still there.	The river is still moving	NAN27

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		But I just put life to be even so that the sugar can be controlled Putting life 'even' means 'staying stress free' or 'taking it easy' to ensure the blood glucose remains controlled.	That is why the water is continuing	NAN29
f. Attitudes	Positive attitudes towards self, diabetes and diabetes manageme nt enhance DSM	At the very end I can see my body has strength and life has settled	That is why the fish is here at the end	K2
		I have normal BP and normal diabetes after undergoing dialysis, I'm continuing with dialysis now		NAN 5
		What helps me are drugs		K2
		This fish tells us, when I was given information it was good news The participant appreciated that, at the time of her diagnosis of diabetes, she was happy to know what medical problem she was facing.	You see here I have drawn fish?	NAN 4
		Life is not bad	It is flowing well	K3
		Because I have been helped by the drugs, I was also helped by the food I eat Participant acknowledges that drug adherence and dietary recommendations are helping her in her self-care.	Now I can see my river is flowing well	NAN 6
		Because we just continue to have that condition but now I understand it is a condition and I have to live with it		NAN 7

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		Participant acknowledges that she has to learn how to live with diabetes.		
		But when I get drugs I take them appropriately and the sugar settles	And then at the end the river flows well	NAN 2
		Now at end, just small problems because I don't lack something to eat Participant is able to manage his condition and minimise problems in his river.		NAN 3
		Those problems if they are missing I'm OK, even I do a lot of work		NAN 18
		I usually go to the farm, when I go to the farm there is a fruit I find in the farm, I weed the fruit, if I find it is ripening well I eat it and I feel good. So I flow well and I work. That is the work I do at home	When my river is flowing	NAN 19
		This tree is putting life 'parallel', you put life 'parallel' so that you can continue with life, because if you don't put life parallel you will find every time you are going to hospital, you go to hospital then when you know how to control your sugars life becomes good Yes, because it is a must you do and you must go through. Now when you put life 'parallel' all those issues pass away Putting life 'parallel' refers to having a stress-free life, even when faced with any type of difficulty. The participant	In my river I have drawn a tree	NAN 20

Categories	Codes	Participant quotes	Kawa metaphor	Partici-pant
		acknowledges that stressful moments do occur, but she does not let such emotions get her down.		
		When I started treatment, I started feeling better, the blood sugar became better	Reduced stone sizes	NAN 22
		Also it makes someone to accept so that the level of sugar can be controlled	And this other one is water and it is continuing to flow	NAN 22
		Even if there are problems like sugar problems, I will find a way for me to live	Some stones are big others are small. Sometimes the river pulls these stones from there ... up up that is when it is flowing it pulls the stones. That is where the river flows, in between stones, it looks for its way through	NAN28

ADDENDUM 16: DSM BARRIERS CATEGORIES, CODES, CORRESPONDING PARTICIPANT QUOTES AND METAPHORS.

Theme 2: Barriers of DSM

Presentation of data categories, codes, and participant quotes that form theme 2.

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
a Economic determinants of DSM	Lack of employment/ money hinders DSM	Now it was a time that I stopped working and I came to, the income that I had reduced, so issues of drugs and clinic became a problem		NAN7
		No, I'm not employed, I just do farming. Getting money for good food is a problem	Stone	NAN20
		What gives me problems is lack of money If there is no money you can't completely do what you are supposed to do Now if I don't have money I'm not able to pay NHIF	Then here these are stones they show lack of money	K2
		The crocodile it represents problems, yes Lack of money, when they told me to buy drugs and I did not have money	This crocodile	NAN4
		Family problems like lack of money	And then stones is lack of money	K3
		Then when I lack the machine, at the same time I don't have money to buy that machine I became a person who lacked medicine to use, just because of lack of money	That is one stone that prevents me	NAN 6

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		And these stones is lack of money and these stones prevent me to move on well with all my issues. Lack of money hinders performance of recommended self-care.	It has stones	NAN5
		My first stone is lack of medicine and lack of machine for monitoring myself, because the price is so high, I don't have the ability to buy because I don't have money	My first stone	NAN1
		No money to buy food and also medicine	Stone	NAN8
		Those are problems that are especially focusing on the side of money Lack of money makes it difficult for the participant to care of himself.	According to how the river flows, then problems continue being more and more, the river has crocodiles even snakes are there	NAN10
		That is lack of money. It is still that lack of money Lack of money is seen as a hindrance to self-management.	My river, at the beginning it has a lot of water, and it is winding a lot And also stones here and there	NAN2
		That is why you can see the snake at the centre, that is … problems, lack of money because I had no energy to work so that I get money to buy medicine	Again this other one is … a snake. Yes, the snake you see it is preventing	NAN21

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
			water from flowing?	
		This tree is Corona problems, there is no money because we cannot do business, we are told to stay at home, I don't have money to come to the clinic, even for drugs is not there Again I'm supposed to have transport so that I come to the clinic. At times I miss coming to the clinic. That is why you see here at the end this tree has fallen in the water and it is blocking the river	I have drawn this thing … It is a tree that has fallen in the water	NAN23
		Yes, there is no money Those are challenges like lack of a job, lack of money for food, and money for coming to the clinic	You see my river, these are stones from the beginning up to here near the end	NAN23
		Crocodile is lack of money, now without money is like the river is drying up, as in this crocodile is drinking all the water, so my river was like drying up. I'm sick, I have no energy to work, so that I get money to buy drugs	Crocodile is lack of money, now without money is like the river is drying Those storms interfere with the river water flow	NAN24
		You see that problem of his it is disturbing many patients. Now like myself, at times I don't have money to buy medicine	It is … a snake, it lies like that in water, now the water goes thaaaat way … where will it pass and the snake is there?	NAN26

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		Ehee, it *[fish*] has hit on this stone and went out of water when problems become too many good things run away from my life. Like if I don't have money I cannot get this, fish or good food	Ha ha ha ha, you know at times when problems are so many the fish runs out of water?	NAN29
	Out of pocket payment is a challenge to DSM	I paid money and they tested me and they found the disease When I started the clinic I had problem of paying money in the clinic	Many stones and the water is moving badly	K1
		Because I was going to a place where I used to pay it became a problem because of lack of money		NAN7
		So I'm forced to buy drugs with my own money		NAN 13
		They told me to buy medicines and there was no money, you see, these are just problems		NAN 21
		And I was asking myself when I go on retire if I will be able to afford those drugs by paying in a private hospital	Big stone	NAN22
	High cost of diabetes management deters self-care	I was told how I will buy drugs and the drugs I would get, then I had … problems with that. So this crocodile are the problems I got because some drugs were expensive, very expensive	So this crocodile are the problems I got because some drugs were very expensive	NAN4
		The drugs I use, because from that time I use drugs. These drugs were affecting another place because drugs are costly	There is this other small stones	NAN10

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		High cost of drugs adversely affected his financial status.		
		Now because problems continue becoming many, on diabetes it becomes more costly Diabetes-related problems increased and this increased the cost of diabetes treatment.	Because as we continue and it continues to become narrow	NAN10
		Also diabetes drugs are very expensive	Stones	NAN13
		And those needles are expensive It [*needles*] is 1 300 shillings per packet and it is not enough per month. So at times I find myself reusing the needles, and that is not good. Now you find even the sugar is not settling		NAN27
		Rice they tell us to eat the brown one, but its price is high so I just eat what I can find		K2
		But when I continued with that clinic [*private clinic]* the doctor was prescribing expensive drugs and I started being worried again. This is worry again, I got stress because now drugs were expensive and also the sugar started going up	The river is going up	NAN22
	v) NHIF premiums are a hindrance to diabetes management	I do not have NHIF cover because I have not paid the 500 shillings		K2
		I have not had money to pay for that NHIF since the year started I have only come to the clinic two times		NAN23

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		I know the county government was looking for people with diabetes so as to pay for them NHIF by the governor, but patients refused to present themselves, it is like the patients fear to contract Corona		NAN22
		I have not heard if the governor is asking people to pay for them NHIF		NAN23
b. Dietary factors influencing DSM	i. Lack of food causes non-compliance to dietary recommen-dations	Food is troubling me. I eat finger millet *ugali*, and getting finger millet is a problem.	This are those small small stones	K1
		Lack of food that is good for blood sugar, those are the problems Participant states that he has a problem getting the recommended food.	You see this frog it is showing noise, noise like the problem of lack of food The snake also is lack of food	K3
		And the other stones are lack of food	Stone	NAN6
		I lack food and wrong food makes my sugars to go up	Yes, I have another small stone here, and this is a small fish	NAN1
		There are times I don't get the recommended food I'm forced to eat the food that is not recommended	These are frogs	NAN20
c. Support structures in DSM	iv. Perceived lack of family support is a	And my husband causes me stress	And here the water is not flowing well	K2

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
	barrier to DSM	I told you my husband causes stress and my sugar cannot settle		
		It was a problem because even those who would have helped me were depending on me, ehhh, that is why you can see I'm getting more problems here, OK?	This other one is a crocodile	NAN4
		Family problems you get a lot of problems from the family until you get stress and it is difficult to think about caring for myself. Her family causes problems for her that cause her to experience stress and be unable to care for herself.		NAN8
		And my wife started having affair with other people. That is a big problem		NAN9
		Because I was pregnant with my last-born child So when I was like that, my husband was not around. Now he had gone to West Africa Then here I was, as I brought him up he started schooling I used to remain alone at home So you find even work I do alone, then you find even controlling sugar, because I do all the work alone which is a lot of work, it becomes a problem Being overburdened by household duties caused the participant to experience psychological stress, which lead to uncontrolled glycaemic status.	Now here on this stone	NAN3

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		My husband refused and he even left home, he has other women outside there It was that this las-born boy he *[the father]* refused to educate him.		
		There we had a problem, there were the small stones here and there, like this other small stone the children were there they were going to school, the others were joining university, those small problems of small stones along the river became many Many family responsibilities contributed to inadequate self-management	Like this other small stone	NAN10
	v. Shortage of health care providers/ supplies and lack of self-care resources is a barrier to DSM	Lack of doctors and medicine makes it difficult to do know how to care for myself		NAN8
		Although other drugs cannot be found in the hospital, we are told to buy. If there is no money he miss to take the drugs		NAN16 (Inform-ant)
		My problems just reduced. You see now at times someone comes you are given one drug and you are told the other drug is missing. So if you have no money, stones are remaining here and there, and you cannot take drugs the way he doctor wants	It is a stone, and you see this other stone? When you come from the crocodile it is stones, as in the water became stormy	NAN24
		You know NHIF helps us but now there in the pharmacy of drugs, at times drugs we are told are finished, we go and buy for ourselves, maybe someone has no money	That is why water has started flowing but small stones are just there	NAN26

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		For example there is a machine for diabetes, this machine for BP, at times I don't have it, at times I have it, and at times I have a problem of buying those things that are needed on these machine. If I don't have those things [*strips]* I cannot check my blood sugar at home.		NAN5
		The problem with that NHIF they don't give us all the things we need to inject ourselves. Like drugs they give me like two bottles. That is OK, but the needles to inject myself with they only give you for one week Surely now when they give me needles for one week you see they are not enough? Now I'm forced to reuse the needles more than once and that is not good And those needles are expensive. Surely they are supposed to give enough needles here in the hospital		NAN27
		The thing that prevents my river is issues of instruments of measuring glucose like the machine, I don't have it to measure myself at home the way they tell us here		NAN6
		My first stone is lack of medicine and lack of machine for monitoring myself, because the price is so high, I don't have the ability to buy because I don't have money		NAN1
		Lack also the machine for measuring sugar is a problem		NAN8

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		If I get the strips I check my blood glucose, but even if I have the machine, those strips for checking sugar levels it is a must I buy every time Yes, you see this is a small hill in my river, that is the problem of not having needles, I have to re-use and it is not good	Yes, you see this is a small hill in my river	NAN27
d. Emotional influences affecting DSM	i. Perceived stress interferes with DSM	That is stress, it went up, until it reached a very high level, it is sugar	Here I have drawn this house, stress free, then I went on, you can see that the house is now upstream	NAN12
		then I had stress, my sugar went up to 34, 36, I was not able to do anything for myself		NAN11
		Which refer to problems that I encountered before being diagnosed to have diabetes. I went through a lot of problems and stress	I have drawn stones	NAN14
		It is stress, every time it is just stress because of being sick There are times when I get stressed up	Stones and the river is getting dirty	NAN20
		But the children also have their own problems. Like this is my daughter but she has diabetes also like me		NAN21
	ii. Factors that cause stress interfere with DSM	That is a lot of stress. My children are in Nairobi and now they cannot come to see me because they are told they will bring Corona here	You see here is a big stone. It is even preventing, almost preventing	NAN22

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		Now they are many problems. It causes stress because going out to the market or places where there are many people we cannot. We cannot even buy food because we are not allowed to go to the market Inability of her children to visit causes stress, which interferes with her self-care.	water from flowing That shows the Corona now that is why you can see I have drawn this big stone	
		And I'm becoming old, I don't have support, maybe I was working then I went on retire, there are no benefits I'm getting Those thoughts brings you, until you have blood pressure, because at the beginning, like myself I did not have pressure, but now I'm continuing like this, I'm continuing here that is the problem we have Because I checked the other day we were in the clinic, those people who have pressure are more than those people who have diabetes Advancing age and diabetes complications seem to be causing this client stress.		NAN4
		I feel the body is very bad, and I wondered where this sugar problem has come from? In our family there is no one who has ever, even my grandfather and grandmother I have never heard they have problem with sugar. It was very disturbing in thoughts and even I'm not able to take care of myself	The water was very dirty	NAN24
		My husband died, now pressure went up, stress, stress, then I	River bends	NAN11

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		came here. My house got burnt, causing more stress. Here I have school children I was educating them and now that is stress and my sugar could not come down Family-related challenges were causes of stress that interfered with self-management.		
		When my children started giving birth to children while still at my home and I was forced to take care of those children	Crocodile are problems at home	NAN14
		What disturbs me, it is thoughts I have small children, getting something for the small children you see it gives me a lot of problems caring for them and myself	Stones	NAN20
		We cannot go to the market, even going to pray to God in church we are not allowed, I don't know if I will get Corona? And I don't have money. Children are not coming to see me because of Corona	Dirty river	NAN21
		My biggest problem is my daughters at home, they have children and they are not married and I don't have a job. Now that is the greatest stress I have, I'm the one providing everything for them and I don't even have enough money for myself	In my river these are stones	NAN18
		This stone is giving me worry, now like today I have been told my sugar is high, 18, because of	This stone is giving me worry, you see it is about to block water	NAN22

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		thoughts, I don't know what I will do with Corona	form flowing well	
		Because this [*NAN 21*] is my mother and I had seen how this problem has disturbed her, so I wondered if I will manage it		NAN22
		You see here, here this is a big wall, us we are surrounded by things to scare us, like that Corona, It is hard to manage diabetes with Corona	This big wall	NAN26
		You know this Corona, I don't know what it is, now people with diabetes we have trouble, we are the ones who are told not to go outside our houses. How shall we get money to buy food and medicine?		NAN24
		Now we are told we should not go to places with many people, we wash our hands, we eat fruits. Ehhhe, now if we cannot go here and there it is difficult. Food and soap where will they come from? I don't know who will help us?	That is why in my river at the end it is very muddy.	NAN24
	iii. Stress adversely affects DSM	And when you get stress sugar goes up, you become weak even to do things for yourself.	And water shows how we are struggling with this issues	NAN8
e. Health/ physical status and DSM	i. Diabetes complications and comorbidities lead to inadequate self-management	Eehh, you see, the disease is still causing many other problems	Then now there are other obstacles, this tree has fallen in the river because with diabetes you find at times you have blood pressure	NAN4

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		Because of sugar, I was admitted in various hospitals and a lot of money is used		NAN10
		I got pressure, I have it Participant declares that diabetes has caused him to develop hypertension complication.	And for this stone	NAN3
		The way life has been difficult since my father became sick, the problems that my father has had like being unable to feed, loss of memory and… being weak, he cannot walk a lot	Stones	NAN 15 (inform-ant)
		Age, yes age 87 years There is nothing he can do for himself apart from bathing Mmh, he cannot even a bit, he cannot take care of himself Advanced age causes lack of self-management by the person with diabetes.		NAN15 (inform-ant)
		I have drawn a crocodile which represents advanced age She cannot take care of herself because of the old age.	I have drawn a crocodile	NAN16
		Is getting eye problems	This stone	NAN17
		This other one is feeling dizzy, the other one is getting eye problems	Here, the stone is here	NAN17
		At first I used to feel tired, I just sleep, I used to feel very thirsty, and then my hand became sick From there I took a lot of water		NAN18

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		I could not care for myself because I was very sick and weak		
		It is that … sugar going up No, mine is usually 4, going up to 20, 30 Yes when I started it was 30	Stones	NAN18
		My river, what prevents it from flowing well is pressure, I'm unable to do my work, and now when my pressure goes up I'm unable to perform my usual duties		NAN19
		You find the sugar is always going up every time, maybe I get headache a lot, the legs refuse to walk properly, walking becomes a problem, at times finding sleep is a problem	Stones	NAN20
		It is the problem of this disease. My body had no energy, I was unable to work as I used to work earlier Participant is unable to work and care for himself because of lack of strength.	Stones	NAN21
		At times I become sick I lack energy to get grass for the cows … I mean fodder		NAN25
		Now you see this is a tree that fell in my river, it is this sugar problem Now the work of keeping animals I'm defeated, even money is not available because I lack energy for other things Because the patient is sick and has no energy, she cannot work	This is a tree that fell in my river	NAN25

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		to earn money for her self-management.		
		That is this sugar disease, the disease can go upppppppp, very high	This is a very tall tree	NAN26
		Trees, there are trees that I drew first, these were like challenges Yes, I did not know the problem I had, so it was necessary, I had a wound, then I went to hospital, and I realised it was not getting healed. Until the doctor saw that because the wound had been treated for a long time without healing, then they took samples Then they told me I had diabetes	It is this small trees I had drawn, small trees I have drawn Yes, yes yes, the stone is like lack of knowledge	NAN4
		I had fatigue, drinking a lot of water, I did not know where the problem was. I was just weak, I did not know what to do Lack of awareness/lack of diagnosis delayed self-management practices.	Now here the river starts, it has mud	K2
		Let me remember … one day I had an operation, I had gotten a motorbike accident, then these bones separated, discs, then I was admitted in MP Shah Hospital. That is what it means Patient was admitted with fractured bones and could not care for himself.	Then this is another stone	NAN9
		This is another time that even myself I'm admitted in various hospitals, that causes a big problem	And coming to this other point I find my river has other that is big even it was blocking, it was almost	NAN10

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
			blocking the river, it even made the river to expand a lot	
		My eyes do not see very well Reduced eyesight makes self-management a challenge.	I have other small stone	NAN1
		Since I got this disease of diabetes I started using medicine called metformin, and that medicine reduces male power. That problem is still there because I'm still using that medicine	Stone	NAN9
		I used to get admitted, I'm discharged, I'm admitted, I'm discharged until I was diagnosed to have diabetes when I was expecting that boy Afterwards, when I was delivering him, I was operated	So it was that this crocodile shows those problems I went through	NAN3
f. Attitudes related to DSM	ii. Negative attitudes towards self/ diabetes/ diabetes management compromises DSM	Eehh, you see, the disease is still there, you see you think this disease will not end	Stones	NAN4
		From there, there is a tree, that tree is preventing me from getting to the other side, so we can say this tree, I cannot cross the river, and the river is to say that disease I have Perceives diabetes as a hindrance to his life.	From there, there is a tree	NAN5
		Other stones are diabetes, when I was diagnosed to have diabetes, that was something that that disturbed me a lot	From there I just still have other small stones	NAN5

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		It was not easy to change my lifestyle that time Because of the way we were used, like if it is at home, if it is my wife, the way she is used to cook, it was difficult. So it took time	That is why I had turbulence in my river at that time	NAN7
		Yaah, now from there, now I have started dialysis, now going into dialysis, it has its own issues	And that is the stone	NAN5
		It represent the time when I was diagnosed to have diabetes The participant did not take diabetes diagnosis positively	First I start with the first one here, it is a hippo	NA 8
		My river has stones. The first stone here shows the turbulence which I got when I was diagnosed that I have the condition of diabetes	My river has stones. The first stone here shows the turbulence	NAN7
		Since I got this disease of diabetes I started using medicine called metformin, and that medicine reduces male power	This stone is problems	NAN9
		I came to the first stone, very big one, This is the time I was diagnosed I'm diabetic, and I was much younger than now.	I came to the first stone, very big one	NAN10
		This is sugar problems. It goes up and down	But right a head my river has a lot of turbulence	NAN2
		These stones are the place where problems began when I became diabetes	The stones	NAN3

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		Here is when I got diabetes then I went, I went, stress went up		NAN11
		This my river first it was very good. Before I got diabetes condition. But now I was told I have diabetes, that was a very big problem, I did not know how to care for myself	This is mud, that is the river became very dirty	NAN24
		She takes very many drugs which are very expensive Ten types of drugs	Crocodile	NAN16 (inform-ant)
		And not being able to control sugars well, at times it is down and at times it goes very high		NAN16 (inform-ant)
		It means sugar going up and again it drops. The body becomes very weak even to do other things for myself	Stones	NAN13
		Before I got this disease I was very fine. My river was going very well. But when I was told I have diabetes, it was difficult to accept. I did not even accept to take drugs	Stone	NAN22
		This snake is problems, here in the water it can bite someone, now if problems continue it is like a snake wants to bite me, it can kill me. If this disease has no medication it is like a snake to kill someone. And that is why you see stones, here you hit yourself as you continue with life, it can stop the river from moving forward.	His snake, you see stones	NAN25
		I had been so sick, I went to hospital the doctors examined me and said I had diabetes. I did	Now, as I continued here this is a stone	NAN27

Categories	Codes	Quotes by participants	Kawa metaphor	Parti-cipant
		not believe, in our family there is no diabetes, I have never heard now it became difficult for me to accept that I have this disease, that is the stone I have drawn You know accepting that story was very difficult		
		Another day I was admitted and I was very sick, this is the diabetes problem it is at the centre of the water, now even the water is not flowing well Participant considers diabetes to be a dangerous disease.	This is a very dangerous animal, he is at the centre of the river	NAN27
		When I started this disease I had a big problem accepting that. Life was difficult The stone is the difficulty of life. There is nothing as difficult as a stone. Because I was told I have a sugar pIoblem, I was stranded what will I do?	That is why I have drawn this stone here	NAN29
		This is about thirty something years because it was in 1987, a long time, I was not old as I'm now		NAN10
		And then I was told when I was very young I have stayed with this problem for like three years, that is I was 32 years, I was very young		NAN27