

**THE FOOD SECURITY AND QUALITY OF LIFE OF THE HOUSEHOLDS
INVOLVED IN THE OYSTER MUSHROOM PROJECT IN MASERU, LESOTHO**

by

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Now unto Him who is able to do exceedingly and abundantly above all that we can ask or think, according to the power that worketh in us.

Ephesians 3:20

DECLARATION

I declare that the thesis, **THE FOOD SECURITY AND QUALITY OF LIFE OF THE HOUSEHOLDS INVOLVED IN THE OYSTER MUSHROOM PROJECT IN MASERU, LESOTHO**, hereby submitted for the qualification of Masters at the University of the Free State, is my own independent work and that I have not previously submitted the same work for a qualification at/in another university/faculty.

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I hope that this study will contribute towards the efforts to achieve a better quality of life and food security for the households in Lesotho.

ABSTRACT

Food insecurity and poor quality of life are among the challenges that have delayed development in developing countries. Lesotho is among the African countries that persistently experiences high food insecurity. The country is also faced with poor quality of life, which is indicated by the high prevalence of communicable and non-communicable diseases, poor access to water and sanitation and low household income levels among others. One of the initiatives that aims to improve the household food security and quality of life of the nation, was the introduction of Oyster mushroom cultivation, a project that is sponsored by an external donor in cooperation with the government of Lesotho. This study sought to describe the food security and quality of life of the households involved in the Oyster mushroom project in Maseru, Lesotho. The specific objectives of the study were to describe the quality of life of the households engaged in the Oyster mushroom project; to assess the income of the households involved in the Oyster mushroom project; to describe the household food availability of the households involved in the Oyster mushroom project and to report on the household food access of the households engaged in the Oyster mushroom project.

A survey was undertaken among the households (n=33) involved in Oyster mushroom cultivation in Maseru. The Statistical Package for Social Sciences (SPSS) version 25.0 was used to analyse the data. Descriptive statistics were used to organise and summarize data to enable interpretation. The descriptive statistics involved frequencies, binomial and Chi-square tests, to support the interpretation of the results. The results indicated a high prevalence of diseases and the need for medical help, which suggests poor quality of life since the percentage of households involved in the Oyster mushroom project (HOMP) that received care from health services, without staying overnight, was high (72.7%). None of the HOMP have medical insurance schemes, because most of them have low income levels. Consequently, HOMP (78.8%) spend part of their income on health related items. Arthritis, high blood pressure, influenza and pain were the main reasons most households bought health related items four weeks prior to the survey.

The households do not use energy sources that have a negative effect on health and the environment, such as biomass. The households mainly use Liquefied Petroleum

Gas (LPG), electricity and kerosene with more than half (54.2%) using LPG. The responses further indicated that the households experienced a significant lack in quality rather than quantity of available foods. Access to food and money was never experienced as enough, as 15% of the households did not have enough food for three meals every day, although no person had to go a day without food or with only one meal the previous day. Approximately a quarter of the households experienced a severe lack of food.

Despite cultivating the mushrooms and having access to it, 69.5% of the households were seasonally food insecure and their main income was formal employment, as cultivation was not sufficient. More than half (51.2%) of HOMP have low income levels, one household depends on mushroom production only, the other households get supplementary income from the Oyster mushroom project. Oyster mushrooms are not an indigenous food to Lesotho, therefore acceptance by consumers was limited, resulting in a smaller market than anticipated, and thus the desired increase in income was not seen. Although access and availability was not positively influenced, access to clean water and improved sanitation was better than the majority of the population. For this initiative to be successful, consumers need to be sensitised to the consumption of Oyster mushrooms, stimulating a market for the producers, thereby potentially increasing food security.

Key words: food security, food insecurity, quality of life, Oyster mushroom, income, food availability, food access, energy, health, water and sanitation.

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LIST OF ABBREVIATIONS/ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AUSAI	Australian Agency for International Development
BoS	Bureau of Statistics
CAADP	Comprehensive African Agricultural Development Programme
CMU	Central Mother Unit
CPI	Corruptions Perceptions Index
DES	Dietary energy supply
ESA	Eastern and Southern Africa
FAO	Food and Agriculture Organization
FNSP	Food and Nutrition Security Policy
GDP	Gross Domestic Product
GFSI	Global Food Security Index
GNP	Gross National Product
HIV	Human Immunodeficiency Virus
HOMP	Households involved in Oyster Mushroom Production
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
LPG	Liquefied Petroleum Gas
LSL	Lesotho Loti
MDG	Millennium Development Goal
NEPAD	New Partnership for Africa's Development
NSDS	Nato Strategic Direction South
QOL	Quality of Life

SADC	Southern African Development Community
SDG	Sustainable Development Goal
SOFI	State of Food Security and Nutrition in the World
SPSS	Statistical Package for the Social Sciences
TB	Tuberculosis
UN	United Nations
UNDP	United Nations Development Program
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children’s Emergency Fund
UNICEF	United Nations Children's Fund
USD	United States Dollar
WASA	Water and Sewerage Authority
WASCO	Water and Sewage Company of Lesotho
WFP	World Food Programme
WHO	World Health Organisation
WHOQOL	World Health Organisation Quality of Life

CHAPTER 1: THE ORIENTATION TO AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

The relationship between food security and quality of life (QOL) has been established by several researchers (Baptista *et al.*, 2018; Moafi *et al.*, 2018; Hatsu *et al.*, 2014), and have been global focus areas. Both concepts were part of the issues that needed attention in the setting of the Millennium Development Goals (MDGs) and have continued to be a concern, as they were also incorporated in the Sustainable Development Goals (SDGs). The food security and QOL of individuals are central to the well-being of the global community. Food security in its simplest form can be viewed as all people having adequate access to sufficient food at all times (FAO, 2009). QOL is a concept which includes the physical and psychological health, independence of an individual, social life and how they relate to their environment (McCall, 2005). Access to nutritionally adequate food and essential services that are pivotal to QOL and food security such as health, water and sanitation, remains a challenge in the world, and the challenge is more severe in Africa (African Development Bank Group, 2019a; FAO, 2019).

In 2015, the world leaders from 193 countries came together at the United Nations General Assembly to set new goals upon the expiry of the MDGs. The SDGs that commenced on the 1st January 2016, will expire on December 31, 2030. The 17 goals, consisting of 169 targets will work as a guide to the development paradigms of the countries (UN, 2016a). Since the release of the SDGs in 2015, the United Nations (UN) and other organisations have continued to put food security as a top priority of the great challenges facing the world. MDGs target 1C: “To reduce by half between 1990 and 2015, the proportion of people who suffer from hunger”, was amended in the SDGs. SDG 2: “To end hunger, achieve food security and improved nutrition and promote sustainable agriculture”, adds nutrition and sustainability to MDG target 1C (Stephens *et al.*, 2018).

The 17th goal of the SDGs states that there is a need for global partnership that encourages all stakeholders: governments, civil society, the private sector, the UN system and other actors to unite and mobilise all available resources, as well as

working together to implement the strategies that work towards achieving these goals for the countries involved. This support system is mostly imperative for developing countries, in particular the least developed countries, landlocked developing countries (for example: Lesotho) and small island developing states to enable progress for all. The UN is contributing substantially as a partner to countries assisting in the implementation of the SDGs (UN, 2016a).

The UN (2018) also stated that the SDGs make use of partnerships to practically implement programmes that will improve QOL in a sustainable way, for the current and future generations. They provide clear guidelines and targets for all countries to adopt in light of their own challenges and the environmental challenges of the world at large. The SDGs accommodate most challenges that the global community is facing. They place great emphasis on tackling the root causes of poverty and bring the world together to make a positive change on the QOL for both people and the planet.

The African countries are utilising the SDGs to address their challenges, as food security and nutrition are a priority of the continent's development agenda (FAO, 2017b). Africa is known to be a low-income continent and the challenge of food insecurity is highly prevalent. While Africa is a continent rich in both natural and human resources, it remains one of the world's poorest continents with very slow development. This is aggravated by famines caused by insufficient food production, due to droughts and land degradation that affect the productivity of agricultural land, which in turn threaten food security in many African countries. Although the continent has had achievements, such as high economic growth rates in the last decade, hunger is still one of the biggest challenges faced by the continent (Samar, 2014).

In line with the 2015 deadline, set for achieving the Millennium Development Goal targets, Sub-Saharan Africa (SSA) made some progress towards halving the proportion of its population suffering from hunger (MDG 1.C target). Approximately one person out of four in SSA was undernourished in 2015, compared to a ratio of one out of three in 1990-92 (FAO, 2015). While the number of undernourished might have declined, in terms of prevalence of undernourishment, sub-Saharan Africa has the highest level of all regions in the world (FAO, 2017b).

The African region has the highest prevalence of undernourishment. The results from tracking progress related to the SDG Indicator 2.1.2, which targets to ensure access

to food for all, indicated that an estimated 2 billion of the world population is faced with some level of food insecurity. Some of these people may be moderately food insecure, and they may not necessarily be suffering from hunger, but lack regular access to adequate and nutritious food, making them vulnerable to malnutrition and general poor health. The findings further report that even in high-income countries, fairly large proportions of the population lack regular access to adequate and nutritious food, implying that their food insecurity levels are mostly moderate (FAO, 2019).

Access to basic services is essential for achieving food security and QOL. Yet, only 72% of the African population has access to safely managed drinking water, and only 40% has access to safely managed sanitation facilities. Overall, access is higher in North Africa than in the rest of the continent. There are still major differences in gaps between access rates in urban and rural areas in Africa. Climate change is leading to increased occurrences of drought and floods, creating further challenges to the provision of basic services. Africa needs reformations and interventions to ensure that everyone has access to services to better their well-being (African Development Bank Group, 2019b).

Health is related to economic development, because healthy people are more productive, and healthy infants and children can develop better and become productive adults. A healthy population can also contribute to a country's economic growth. The African region has had improvements in health outcomes during the past decade. There has been a considerable decrease in the burdens of several diseases (WHO, 2014). However, the quality of essential services, including access to health, water and sanitation remains a challenge in the region (WHO, 2018b). Direct causes of ill health and death in the African region are varied, with lower respiratory infections, HIV/AIDS and diarrhoeal diseases, being the top three causes of both morbidity and mortality. While Africa has had improvements related to health, there is still a long way to go in improving the health related QOL of the continent (WHO, 2018b).

Lesotho is one of the less developed countries that continues to struggle with persistent development challenges, including chronic poverty, a burden of communicable and non-communicable diseases and high levels of unemployment. The unemployment is estimated at more than 25% of the total labour force, and 45% among the youth. The country's high poverty rate (57.1%) indicates that one in two

people is experiencing poverty (Reliefweb, 2018). There also exists the challenge of increasing population, and as a result, addressing food security requires measures to deal with increasing food shortages for a rapidly growing population. With a predicted increase of 1.7 billion in world population between now and 2050, there is great pressure on the decreasing resources to produce enough food (McCarthy *et al.*, 2019).

1.2 RESEARCH PROBLEM AND OBJECTIVES

1.2.1 Research problem

Lesotho is one of the sub-Saharan countries faced with the challenge of food insecurity and poor QOL. The UN is assisting the Lesotho government with implementation of the SDGs, as Lesotho is not an exception to the challenges facing the global community, specifically the African continent (UN, 2016b). One of Lesotho's greatest challenges is that it is generally food deficit, therefore the fight against food insecurity is a top priority in the country's development agenda (Reliefweb, 2018).

Despite the economic growth that Lesotho has experienced in the last two decades, severe poverty remains a constraint (Smith *et al.*, 2013). Between 2001 and 2010, there was an improvement in the country's economy. The main contributions to this growth were mining, public investment and textile exports. The contribution from agriculture was minimal, yet most households (especially in the rural areas) depend on it to earn a living. As a result, people in the rural areas did not benefit from this economic growth. The World Food Programme (WFP) (2018) reported that over half (57%) of the households lived below USD1 (US dollar; LSL14.71 Lesotho Loti) per day (the basic needs poverty line) and 34% lived below the food poverty line (USD10.30; LSL138).

The Government's budget allocates 7% of its national budget to social protection programmes, such as school meals, pension for the elderly, child grants and public works. The population's high vulnerability is a result of recurring climatic hazards, including droughts and early frost. The economy is performing poorly and 29% of people below the age of 35 years are unemployed. The country is also faced with a human immunodeficiency virus HIV prevalence rate 24.6% and should provide care

for more than 250,000 orphaned children, most of whom lost their parents to Acquired Immunodeficiency Syndrome (AIDS) (UN, 2017).

Access to health services, water and sanitation are part of the challenges that Lesotho is faced with, affecting the food security and QOL of the citizens. The United Nations (UN) Lesotho reported that 7 countries accounted for more than 80% of the numbers of new infections, AIDS related deaths and prevalence in HIV on Eastern and Southern Africa (ESA) in 2015. However, the 7 countries with the highest burden of new infections, include Swaziland and Lesotho with a higher burden than South Africa. Lesotho also has the highest burden of AIDS related deaths among the 7 countries with more than 80% of AIDS related deaths. Lesotho also ranks first in Tuberculosis TB globally and has a high HIV and TB infection of 72% (UN, 2017). Therefore Lesotho's health problems need interventions to improve the QOL of the nation.

Regarding water access, the sources of water for urban and rural households are different. The majority (70%) of households in the urban areas have piped water in their own yard or dwelling, while households in the rural areas mainly use public taps (56%) and unimproved sources (23%) such as unprotected springs. The minority (5%) of the households have piped water in their own yard or dwelling; and 37% take 30 minutes or longer to and from the water sources (Ministry of Health Lesotho & ICF International, 2016).

In addition, only 50% of the households in Lesotho use improved toilet facilities, which are defined as non-shared facilities that prevent people from coming into contact with human waste and thus reduce the transmission of cholera, typhoid, and other diseases. Over a quarter (27%) of households do not have access to any toilet facility. The most common toilet facility in Lesotho is a pit latrine with a concrete slab. While only 6% of the households in the urban areas use unimproved toilet facilities, 39% of the households in the rural area have unimproved toilet facilities or none at all, which places them at higher risk of disease transmission (Ministry of Health Lesotho & ICF International, 2016).

Another way to improve food security and QOL, is improving agriculture. Agriculture is central to fostering economic growth, reducing poverty, and improving food security in the Southern African region. More than 70% of the rural population depend on agriculture for their livelihoods, and regional economic growth has been constrained

by poor performance in the agriculture sector. Achieving the SDGs on poverty in Southern Africa will largely depend on increasing agricultural productivity and trade (USAID, 2018).

Agricultural production in Lesotho has been negatively affected by widespread land degradation. Moreover, poor range management practices have contributed to land degradation, leading to decreased agricultural outputs and grazing lands, which both worsen food insecurity for the majority of the population. The ecological functions of wetlands, which are sources of rivers and have an impact on quality and availability of water, are affected by soil erosion, which results in siltation. Sedimentation also affects the availability of water for different uses, as it decreases the lifespan of dams (Lesotho Water Partnership, 2016).

A report from the Ministry of Agriculture and Food Security in Lesotho (2018) states that as a way to alleviate poverty and improve QOL, in 2007, the Government of Lesotho sourced assistance from the Government of China through a technical cooperation aiding Programme to Africa. The objective of the technical cooperation was to develop and implement JUNCAO - Jun from fungi, and Cao being the Chinese word for grass (Oei & Nieuwenhuijzen, 2005) mushroom industry as a model that can sustainably recover livelihoods in Lesotho through a supply of mushroom protein food, to reduce malnutrition and protein deficiency among extremely poor people. It was also aimed to create job opportunities among rural people, especially the physically challenged, youth and women. The project was also expected to protect the environment through grass cultivation in degraded lands, offering soil conservation measures and reducing livelihood dependency to the environment (Ministry of Agriculture and Food Security, 2018).

Upon receiving assistance, the Central Mother Unit (CMU) facility was established as a JUNCAO demonstration base to provide high quality spawn/seed to mushroom growers in Masianokeng, a village in the capital city of Lesotho, Maseru. The centre started spawn production with a few (number) farmers in 2007. Currently, more mushroom enterprises have been established across the country, but mostly in the urban area of Maseru (Ministry of Agriculture and Food Security, 2018).

Food insecurity and QOL are interlinked, an example in such an instance is water insecurity, which adversely affects food security (Workman & Ureksoy, 2017), as well

as food insecure individuals who are physiologically and socially vulnerable to HIV (Weiser *et al.*, 2011). This indicates that food security and the indicators of QOL (such as health, water and sanitation) all intersect and contribute to the wellbeing of individuals. This study aims to describe the food security and the QOL of the households engaged in the Oyster mushroom project in an urban area (Maseru) of Lesotho, where the households engaged in the project are concentrated. Their food security and QOL will be described in light of the aforementioned challenges.

1.2.2 Research objectives

The main objective of this study is to describe the QOL and food security of the households involved in the production of Oyster mushroom. The specific objectives are:

1. To describe the QOL by means of living conditions of the households engaged in the Oyster mushroom project.
2. To describe the household food security of the households involved in the Oyster mushroom project.

1.3 SIGNIFICANCE OF THE STUDY

The results of this study will be valuable in assessing the potential contribution of the Oyster mushroom project to QOL and food security and recommendations for the implementation and sustainability of the project. Furthermore, the data will inform the designing of interventions needed in addressing the challenges related to food security and QOL. The results will further reflect the areas that need the most attention in improving household food security and QOL, as well as identify the role that consumer sensitisation can play.

1.4 DEFINITION OF TERMS

Food insecurity: “Refers to the social and economic problem of lack of food due to resource or other constraints, not voluntary fasting or dieting, or

because of illness, or for other reasons” (National Research Council, 2006).

Food Security: “When all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2009).

Fruiting: “Projections of Oyster mushrooms that look like pin heads” (Mensah, 2015).

JUNCAO: Jun from fungi, and Cao being the Chinese word for grass(es) (Oei & Nieuwenhuijzen, 2005).

Malnutrition: “A state of nutrition in which a deficiency, or excess, of energy, protein and micronutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function, and clinical outcome” (Stratton, Green & Elia, 2003).

Poverty: “Whether households or individuals possess enough resources or abilities to meet their current needs” (Coudouel, Hentschel & Wodon, 2002).

Quality of life: “Individuals' perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (Saxena, Orley & WHOQOL Group, 1997).

Sedimentation: “Is the build-up of sediments (particles) at the bottom of a reservoir which compromises its ability to store water for the purposes for which it was built” (Lesotho Water Partnership, 2016).

Siltation: “When soil is swept into lakes and rivers as a result of soil erosion, which cause the finest particles to become suspended in the water, making it appear dirty” (Lesotho Water Partnership, 2016).

Spawn: “Is the mycelium of fungi of mushrooms grown to be eaten” (Mensah, 2015).

- Spawning:** “Is evenly mixing the substrate and the spawn leaving the mixture under optimum temperatures and humidity to allow the mycelium to develop” (Randive, 2012).
- Stunting:** “Is growth retardation in children as a result of poor diets or recurrent infections. Stunting is the result of long-term nutritional deprivation and often results in delayed mental development, poor school performance and reduced intellectual capacity” (WHO, 2010).
- Substrate:** “Is any material that serves as a medium that provides an environment where the growth of a living organism (mycelium) can occur, allowing enzymes to be active and release nutrients for the growing organism” (Randive, 2012).
- Undernourishment:** “Consumption of dietary energy that is less than a pre-determined threshold. The threshold is country specific and is measured in terms of the number of kilocalories” (FAO, 2008).
- Urbanisation:** “Is a change in the proportion of urban populations; the migration of people from a rural area to a city that is faced with population growth” (Beall, 2000).
- Wasting:** “Is a symptom of acute under-nutrition in children, usually as a consequence of inadequate food intake or a high incidence of infectious diseases, especially diarrhoea. Wasting weakens the functioning of the immune system and can lead to increased severity and duration of and susceptibility to infectious diseases and an increased risk for death” (WHO, 2010).
- Water security:** “Refers to water management and the balance between resource protection and resource use at local, national and regional levels” (Global Water Partnership, 2000).

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter consists of important and relevant literature that supports this study. It expounds on quality of life (QOL), its measurement and relationship to the fulfilment of human needs. Furthermore, it reports on food security, its measurement and pillars. A discussion on the causes of food insecurity, the effects and the ways in which food security can be improved, are also presented. The role of agriculture in preventing food insecurity and alleviating poor QOL is addressed, followed by a section reporting on food security in Lesotho, which informs the inspiration to carry out this study. An overview on Oyster mushroom production, its roles in preventing food insecurity and its introduction in Lesotho is given.

2.2 QUALITY OF LIFE

2.2.1 Quality of Life defined

Literature reflects the complexity of quality of life (QOL) and thus an intricate concept to define. QOL is the holistic analysis of human life experiences. This term has been used in many disciplines, including: psychology, medicine, economics, environmental science and sociology (Constanza *et al.*, 2007). According to Church (2005), the majority of the articles that define QOL attest to its subjective, multi-faceted nature and the difficulty to measure it. As a result of his work on understanding and summarising different definitions of QOL, the following definition has been proposed: "QOL is a measure of an individual's ability to function physically, emotionally and socially within his/her environment at a level consistent with his/her own expectations."

QOL is the extent to which human needs are satisfied in relation to the role of the needs to an individual's opinion about their wellbeing. It appreciates the perception of an individual about ideal standards of the different faculties of his/her life. QOL is multi-dimensional in nature and refers to an individual's holistic satisfaction with life and total wellbeing. It can be assessed in terms of psychological well-being, physical health, economic prosperity, and social connectedness (Thuku, 2016).

QOL may differ with individuals and the groups they belong to. While QOL may mean a stable income to one individual, it may mean healthy family bonds to another. Theofilou (2013) agrees that QOL does not only have an objective approach, but has a complex nature that requires multiple approaches. The subjective and the objective approaches to QOL complement each other in understanding the concept. A comprehensive understanding of the subjective approach to QOL requires that the influence of objective indicators of QOL of people's assessment on their lives be determined. In the same way, people's values, culture and experiences must be considered in order to select objective indicators of their QOL (Theofilou, 2013).

An approach to defining QOL that attempts to integrate the objective and subjective approaches, results in a definition that states: "QOL is the extent to which objective human needs are fulfilled in relation to personal or group perceptions of subjective well-being" (Constanza *et al.*, 2007).

According to the definitions there are human needs which can either be subjective or objective. A QOL index must therefore be inclusive of the subjective and objective opinions of people on their wellbeing, or the results may be misleading. It is also implied that human beings work towards ensuring that they have a good wellbeing, according to the standards of living and values that they have. Their different social groups will also affect their opinions and preferences.

2.2.2 Measurement of Quality of Life

The measurement and assessment of human experience have been a major goal for individuals, communities, researchers and government. The attempt to measure QOL has to address the concept holistically (Constanza *et al.*, 2007). It is stated by Kironji (2007) that QOL has been mostly measured economically, using factors such as the Gross Domestic Product (GDP), Gross National Product (GNP), and per capita income. While these measures are important, they do not emphasise access to resources. Access to resources has a substantial contribution in the assessment of people's living conditions, for it reflects the human experience that people prefer.

QOL is determined by the relation between the human needs, the people's perception on the fulfilment of these needs and the availability of opportunities to meet the

needs. The opportunities in this regard are those that meet human needs sustainably, to achieve the individuals and/groups' subjective well-being (Constanza *et al.*, 2008).

As far back as 1979, literature attests to the challenge of having a universal way to determine QOL, mainly because QOL is influenced by multiple factors including, an individual's physical health, mental health, independency and the social effect of the environment on them (Shin, 1979). QOL addresses the satisfaction of an individual with his or her real life in comparison with the life they hope to attain. The assessment of QOL is also determined by the individual's values and the culture of the community they belong to (Gilgeous, 1998).

In addition, a submission by Diener and Suh (1997) suggests three approaches that determine QOL. The first approach is where the standards or measures of QOL are set by religion, philosophies, cultural practices and values that a person lives by.

The second of the approaches is that the satisfaction and preferences of individuals/groups form the basis of a good life. This approach suggests that QOL is determined by the measurement of the ability to acquire desired things. This is why individuals and families opt for a life that satisfies their desire within the resources they possess.

The third approach to the determination of QOL is one that is mostly related to subjective wellbeing, as it relates to the experiences of individuals. In this case what an individual reports about their well-being is what it really is. The experience may be observed by another as undesirable, but if the experiences are desirable to them, it is considered to be true. This approach appreciates feelings and experiences that bring joy, happiness and satisfaction with life.

In addition there are two methods of measuring QOL. The first one focuses on the degree to which the human needs have been fulfilled by the economic and social indicators. This method is also known as the objective wellbeing. The other focuses on the perceptions given by individuals about their happiness, pleasure, fulfilments and has been termed subjective approach to QOL. Constanza *et al.* (2007) suggests therefore that the QOL must be measured holistically with the use of the two methods: the perception on the subjective wellbeing and objective human needs. Combining the two methods to measure QOL reflects the reality of human experiences in relation to

the contribution of the subjective and objective indicators to an improved QOL (Constanza *et al.*, 2008).

In summary, the definitions and ways to measure QOL differ from one researcher to another. However, the similarity from these definitions is that the fulfilment of human needs is central to measuring QOL. QOL is measured by the level of fulfilment of the physical, health and social functioning in individuals' lives. Individuals perceive their relationships and psychological wellbeing according to their own expectation – which are affected by a variety of factors like culture, value systems, goals, stable beliefs and concerns.

2.2.3 Fulfilment of Needs

Although scholars agree that human kind have needs, there are several theories that are found in literature on human needs and their fulfilment.

As early as 1954, Abraham Maslow conducted research related to human motivation. He proposed a hierarchy of human needs. Maslow theorised that human needs have five levels, and these are presented in a hierarchy with a specific order from the lowest to the highest. His theory is such that needs in the lower level must be fulfilled before the next higher level will be fulfilled. A deficiency for the next level must arise so that there is a need to fulfil that particular need. He also submits that it must be known where an individual is in the hierarchy of fulfilment of needs, to be able to motivate them (Huitt, 2007).

Maslow's levels of human needs are as follows (Uysal *et al.*, 2017; Petrakis, 2014):

- a. **Physiological needs:** The first level deals with biological needs that are basic for survival, such as food, shelter and clothes. These are the needs related to the biological human processes, such as breathing, eating, drinking, sleeping and resting. These needs are basic to human life. Inability to satisfy these needs affects the satisfaction of the needs in other levels substantially.
- b. **The need for safety:** The second level addresses the need for safety and security. These needs include safety from any form of danger, feeling confident and unfearful (Daft, 2013). Humans make efforts towards ensuring that they are safe and secure from all dangers, including the natural threats to their lives.

Financial security, such as stable employment and sufficient savings are another form of safety.

- c. The need for love: When the above categories have been satisfied to a large extent, the third level then deals with humans' need for family, loving, being loved and companionship. This results in the formation of relationships, as a means to satisfy this need.
- d. The need for esteem: The fourth level is an extension of the need for love. It addresses the need to be appreciated by others, respected, being esteemed and appreciated by other individuals. It also includes the need to belong to social groups and being accepted. The need for esteem can be expressed in two ways: one is the need to be appreciated by others, while the second speaks to the need for self-appreciation and self-esteem (Griffin, 2013; Maslow, 1954).
- e. The need for self-actualisation: Subsequent to all previous needs being fulfilled, an individual may still have an unsatisfied need. This calls for self-actualisation, and identifying activities that fulfil each individual. This is the need to excel in an individual's abilities. It is a fulfilment brought about by functioning within one's abilities and talents.

On the other hand, Alderfer submits that Maslow's hierarchy can be reorganised into three groups: existence, relatedness and growth. He disagrees with the hierarchy, in that a need should not be at a certain level for it to be particular (Ball, 2013). He suggests that needs can differ from one person to another. Yang, Hwang and Chen (2011) state that Alderfer's theory was based on the relationship between satisfaction of needs and human desires, and using results obtained from empirical studies.

Max-Neef is an economist scholar who developed a theory that had an economic approach to human needs. His focus was on human development to encourage productivity in societies. Max-Neef does not agree with Maslow or Alderfer on the hierarchy of human needs, instead he suggests that needs are interrelated and are the same with individuals, subsequently the way to satisfy the needs is what is different among individuals (Kaur, 2013).

Max-Neef pays attention to needs and the way the needs are satisfied. His theory suggests that needs are finite, they are universal and do not differ among groups of individuals. He pays attention to needs and their satisfiers. Needs are related to each

other and one satisfier may address different needs at a go. It may also take more than one satisfier to meet a need. A satisfier is an existing way of living or being that people use to actualise their needs (Murray *et al.*, 2005).

Additionally, it is suggested that the human needs can be used to generate a set of indicators of QOL. Human needs have satisfiers as Max-Neef suggests, and the satisfiers will enable the fulfilment of human needs. These satisfiers need inputs or opportunities. The inputs include time, natural, social and human resources. Therefore the ability to satisfy human needs is determined by the available opportunities (Constanza *et al.*, 2007). It must also be noted that needs can be satisfied at different levels: individually, in a social group and environmentally (Max-Neef *et al.*, 1992). In summary, fulfilment of human needs for Max-Neef is what defines QOL. Yet, it must be noted that his theory of human needs is not in agreement with the other hierarchy of needs discussed in literature (Murray *et al.*, 2005).

Many scholars have done research on human needs, consequently perspectives are different. However literature reveals that there are disagreements on the universality, relatedness, and the order of importance and the classification of these needs. Some researchers place great importance on how the needs will be satisfied, while others focus more on the hierarchy of these needs. In this study, the focus will be on needs' fulfilment, irrespective of the hierarchy of needs.

2.2.4 Human needs

2.2.4.1 Introduction

This section focuses on describing the human needs. While there are many important human needs, the study only focuses on those relevant to the aim of the research. The needs that are described in this section are: shelter, health, food, water and sanitation. The QOL of the households involved in the Oyster mushroom production is measured with the use of the mentioned needs. The needs are not chosen with respect to any hierarchy or theory, instead these are some of the needs, which the global community, including Sub-Saharan Africa and its less developed countries are struggling to attain for its people.

2.2.4.2 Shelter

Shelter contributes to the physical and psychological wellbeing of humanity, and it also provides safety and security. Shelter provides protection against stresses of the physical environment. It also satisfies the people's psychological and mental requirements by providing a space for love and belonging. One of the most common challenges to having a shelter, is having enough resources to acquire sustainable housing of an acceptable standard for the household (Baqutayan *et al.*, 2015). The house is a basic need of life that is generally taken as a satisfier for other human needs (Murray *et al.*, 2005).

In addition, the quality of the shelter affects the health of those who reside in it and housing conditions determine the quality of the house. Buildings can result in health problems, directly or indirectly. The health of the inhabitants is affected by the design, size of the house and the materials used in the construction of the house. The house also has a psychological and mental effect on the individuals, by being a place of belonging and a fortress from the daily stresses of life. However, there is little data on the correlation between the people's perception on housing, health and subjective wellbeing (Bonney, 2007).

Moreover, Streimikiene (2015) states that having satisfactory accommodation is critical to people's wellbeing, as it is one of the main indicators of material living standards. Housing is a basic need and the need must be met to provide protection, privacy and security. A good shelter will also contribute to the development of children.

In Lesotho, the majority of housing is fully financed by the owner. It is a common practise that owners procure building materials over a period of time, after which construction starts. It takes a number of years, depending on the financial muscle of each household to collect the building materials, but it generally takes a household a minimum of three years before construction commences. Some houses are built in stages, that is, construction will stop when the resources run out, and then the owner will start collecting resources for the next stage (IMF, 2012). There are banks that offer limited credit to homebuilders. Nonetheless, even where credit exists, it can only be afforded by the elite who can afford the requirements of the commercial banks. The poor struggle to build their own houses, since there are no subsidies available to support them (Mots'oene, 2014).

According to the Food and Agriculture Organization (FAO) (2019), there is a rapid population increase in the urban areas and approximately 55% of the world's population reside in urban areas. This increase in population is expected to go up to 68% by 2050. Maseru (the capital of the kingdom of Lesotho), is not an exception to the many African countries that have inadequate housing to accommodate the growing population. Housing challenges in Maseru are a result of poverty experienced by the Lesotho citizens. People from the rural areas move to Maseru, because of the poverty experienced in that part of the country. This leads to unexpected growth that results in inadequate distribution of services. The unemployment rate persistently increases, as a direct consequence of the overpopulation in urban areas. The increase in the population of Africa accelerates rapid urbanisation, with the governments struggling to accommodate the growth of their cities.

Access to services and infrastructure are the most lacking resources in most African cities. Rapid urbanisation has been significantly related to housing shortages, a lack of clean water and sanitation services, and increased crime. Though the city has attracted them, there is not enough capacity to absorb them. As a result, unemployment and poverty have increased in Maseru and this contributes to urban food insecurity. The ongoing retrenchments in South African mines have worsened the situation, making it difficult to live on the available basic services including housing, which continue to be difficult to access in Maseru. This also contributes to urban food insecurity, as hunger and poverty levels increase with the rapid growth (FAO, 2019; NSDS, 2019; Mots'oene, 2014).

In addition, it is stated in the Lesotho National Housing Policy (2018) that among the challenges related to housing that need to be addressed, are the limited access to housing finance, underdeveloped housing market, increasing need for affordable urban housing and low priority of housing in the development agenda (UN-Habitat, 2018).

2.2.4.3 Health

Health directly affects people's wellbeing. The World Health Organisation (WHO) (2012) stated that success in areas of life such as productivity, education, and the ability to generate income are dependent on an individual's state of health. Productivity

does not only affect individual excellence, but results to greater equity, economic return, and social and political stability. A decrease in debts and expenditure on health care can also be expected. Therefore, improved health is central to human growth and development which directly affects QOL. Health is not only an expense to the governments' budget, but it is mostly an important factor that enables the productivity of the nation. Therefore the need for good health and health services is critical to any development agenda (WHO, 2012).

In the results of a study on health care in Africa, reported by Kaseje (2006), the respondents stated that they perceive good health as emotional, psychological, economic, mental and spiritual wellness, as well as mobility and the ability to do all forms of work. The findings on the responses to the signs of good health indicated that physical indicators were frequently cited. These include: ability to work; movement; engagement in physical activities; and absence of aches and pains. Anxiety and depression were not as frequently cited as physical wellness.

In addition, the United Nations International Children's Emergency Fund (UNICEF) (2009b), stated that the results of good health can greatly benefit individuals, communities and their countries. Improvements in health care in industrialised countries in the 1800s, resulted in low child mortality rates, increased life expectancy and decreased fertility rates. Not only that, but food security also improved since there were increased productivity, a rise in incomes, improved shelters, improved services, and technological innovations, especially in agricultural production.

There have been improvements in the global health challenges and although there is improvement during the past decade, people still die unnecessarily from preventable diseases. Sub-Saharan Africa is among the regions that lags behind in health issues. However, there has been remarkable improvements, because since 2000, there has been a decrease in maternal mortality by 35%, and the under-5 mortality rate has lowered by 50%. On the other hand, water and sanitation challenges remain the main cause of global mortality, resulting in approximately 870,000 deaths during 2016. The main causes of these deaths were diarrhoeal diseases, malnutrition and intestinal nematode infections. Globally, the expenditure on health care had increased, as 12% of the world's population (over 800 million people) spent at least 10% of their

household income on health care during 2010, which is an increase from 9.7% during 2000 (UN, 2018a).

Lesotho is one of the developing countries that are faced with challenges related to health. The prevalence of diseases has worsened with increases in the burden of non-communicable diseases, as well as a very high burden of communicable diseases, resulting in the high percentages of visitations to the hospital and health expenses (WHO, 2018a; Government of Lesotho, 2013).

2.2.4.4 Water and Sanitation

For seven continued years, the Global Risk Report placed water crises in its top five global risks in terms of impact on society. It was reported that water crisis and climate change are among the major challenges facing the global community (World Economic Forum, 2017). Dos Santos *et al.* (2017) agree that the global water crisis is a major challenge and is more critical than extreme weather events, climate change, and social instability.

In the 2018 report of the Sustainable Development Goals, it was reported that water and sanitation challenges continue to exist. Lack of access to safe water and improved sanitation facilities is highly prevalent. Progress on social and economic development is negatively affected by floods, improper wastewater management and water scarcity. These challenges that result in water insecurity, need robust interventions to meet the growing water demands from various sectors and users (UN, 2018a).

During 2015, 29% of the global population were experiencing a lack of access to water supplies that are safely managed, and 61% did not have access to improved sanitation services. Furthermore, during the same year 2015, 12% of the global community continued to defecate in open spaces, while only 27% of the population in less developed countries had basic hand-washing facilities. The water stress level in 22 countries, mostly in the Northern Africa and Western Asia region and in the Central and Southern Asia region, is above 70%, implying that water insecurity may worsen in the coming years (UN, 2018a).

There was a remarkable progress in addressing the water challenges when the MDG related to water (target 7.C: To halve the number of population without sustainable

access to safe drinking water and basic sanitation), was achieved in 2010. This entails access to safely-managed water, considered to be access to an improved source, which delivers safe water through its construction, design, piping system (the location of the tap in their dwelling, yard or plot; or public areas) and those without piping systems (such as protected wells and springs, rainwater and boreholes) (WHO & UNICEF, 2017).

Despite the progress made when MDG target 7.C, that is related to water and sanitation was met, the access to clean drinking water remained a challenge in Africa as water sources available for the population are limited (WHO, 2015). The most affected countries, especially in Sub-Saharan Africa (SSA), are the less developed countries (LDCs). Some of the contributing factors to worsening water scarcity are changing lifestyles, increasing population and pollution, and the rapid urbanization. These factors make it difficult to achieve an adequate water supply for the sub-Saharan Africa region (Dos Santos *et al.*, 2017).

Access to adequate sanitation is critical to the people's wellbeing. It directly affects the individual's health as poor sanitation encourages the spread of preventable diseases, like diarrhoea and cholera (Tissington, 2011). Diarrhoeal diseases are released through the faecal-oral-route. Poor hand wash habits and lack of access to facilities increase an individual's chances to get these diarrhoeal diseases (WHO, 2015). According to the WHO (2012), diarrhoea death rates can be decreased by a third through access to improved sanitation, especially in children, and particularly school-going girls.

UNICEF (2009a) states that the water, sanitation and hygiene (WASH) are affected in times of drought. The WASH situation especially deteriorated in 2007 in Lesotho, when low water volumes were experienced with 30% of boreholes and springs in populated rural areas not having water. In addition, 60% of the health care centres were affected as they were experiencing lack of access to safe water. Reports from the health data revealed that 85% of clinics' outpatient consultations in all age groups were due to diarrhoeal diseases. The humanitarian situation in Lesotho challenged the general wellness of female adults and children and was expected to further worsen the prevailing insecure conditions in the country for the next years. However, in 2018, diarrhoeal diseases accounted for 4% of the visitations to health care centres and were

amongst the top ten diseases seen in the clinic's outpatient department, which is a remarkable improvement (WHO, 2018a).

In the capital of Lesotho, Maseru, the Water and Sewerage Authority (WASA) serves over 300 000 people (residential and industrial customers) in the urban areas. The Authority provides safe drinking water to approximately 50 000 post-paid connections, in addition to the approximately 400 public standpipes. The water is mainly sourced from the Caledon (Mohokare) river, which is supplemented by water from the Maqalika dam when river levels are low and when there is high turbidity in the river (WASA, 2010).

In some areas in Maseru, where water is not supplied by WASA, which has been renamed to Water and Sewage Company of Lesotho (WASCO), the households visually examine their water to determine cleanliness. In a recent study by Workman (2019), 52% of the respondents did not boil their water, despite believing that their primary source was not clean. People are often informed about ways to ensure the safety of water, but do not practise these measures as a result of poor habits (related to ensuring the safety of their water) and financial constraints (Workman, 2019).

2.2.4.5 Food

Food is a basic need and should be a right to individuals. The food consumed is determined by cultural values and norms, as well as geographical location. The availability and access to food is a continued international human right that countries endeavour to fulfil. All stages in the food value chain, from farm to fork, contribute in achieving the safety, quality, environmental effects and its ability to feed the world healthily and sustainably (The Economist Intelligence Unit, 2018). Adequate access and availability of food is critical to human well-being. Food is fundamental to survival and limited access to food affects human wellbeing, as there is a direct association between food security, nutrition and health (Havas & Salman, 2011).

There are challenges concerning achieving food security for the global community. The greatest challenges that negatively affect food security are: overpopulation, adaptation to climate change and urbanisation. Areas of the world with the highest

birth rates and population, where demand often exceeds supply, also have the greatest levels of hunger and disease (Havas & Salman, 2011).

While there are some improvements in reducing food insecurity, this is not the case for developing nations where the people are suffering from extreme hunger and poverty. Among the challenges that makes it difficult to make progress in addressing food insecurity is the rising world population. This continuous increase makes it difficult to achieve the relief of food needs of the nation. Challenges that come with overpopulation, include greater demand for natural resources, such as food and fresh water, lack of food and malnutrition and overexploitation of natural resources (such as fossil fuels) faster than the rate of replenishment (Obaisi, 2017).

Furthermore, rapid urbanisation is intensifying the food insecurity situation in SSA cities (Chihambakwe *et al.*, 2018). Cities are experiencing an overpopulation, as the people residing in the rural areas are moving to the urban areas to seek more opportunities and better livelihoods. Yet, the cities do not have enough resources to accommodate the increasing population. Currently, about 55% of the world's population lives in urban areas, and consequently, much of the produced food (80%) is consumed in the urban areas. The population of the people living in urban areas are expected to increase to 68% by 2050 - especially in Africa and Southeast Asia, where hunger and poverty are already high (FAO, 2019).

Moreover, global and local environmental changes, brought about by climate change, are negatively affecting food security. There is increasing evidence that the extremes in climate have reduced food production. The climate changes have reduced agricultural yields, which leads to less food quantities to feed the nation and an increase in food prices (Godfray *et al.*, 2010).

Currently the global community is still faced with a persistent food security challenge. The State of Food Security and Nutrition in the World reported that 821 million people are undernourished (FAO *et al.*, 2018). These findings are complimented by the Global report on food crises, which indicated that in the years 2016, 2017 and 2018, more than 100 million people have experienced acute hunger. There was a decrease from an approximated 124 million people in 51 countries experiencing acute hunger in 2017, to 113 million people in 53 countries experiencing acute hunger, requiring urgent food, nutrition and livelihood assistance in 2018. The suggested cause of the decrease

is changes in the intensity of the climate shocks. The El Niño experience in 2015-2016 resulted in severe drought, flooding, rains, and a temperature rise experienced in 2017. This left many people in deep food insecurity. This includes countries in southern and eastern Africa, the Horn of Africa, Latin America and the Caribbean, and the Asia-Pacific region (Food Security Information Network, 2019).

The food insecurity challenge is worse in sub-Saharan Africa. The State of Food Security and Nutrition in the World (SOFI) report of 2018 indicated that approximately one in five (23.2%) people in Sub-Saharan Africa is experiencing food insecurity. Furthermore, the percentage of people who may have experienced food deprivation during 2017, ranges between 20%-25%. The prevalence of undernourishment continues to rise in all regions of sub-Saharan Africa with the exception of Eastern Africa. The observed increase is not high in Southern Africa, but significantly higher in Western Africa. The situation in Western Africa is possibly brought by factors, including a decline of real per capita Gross Domestic Product (GDP) growth rising food prices and droughts (FAO, 2018).

In Lesotho, food insecurity continues to be a problem. Lesotho is among the poorest countries in sub-Saharan Africa, with half of the population (over 1 million) living in poverty. Of this number, about 34% are extremely poor, living below the national food poverty line of M138 per adult per month (about US\$10). Poverty in Lesotho is worsened by a very high prevalence of HIV (25% among adults); high unemployment (27.7%) and 32% unemployment among youth, adapting to the results of climate change, such as droughts and floods (World Bank, 2019; UNICEF, 2018).

2.2.5 Factors in fulfilling basic needs

This section discusses energy, income, employment and home industry income activities as factors in fulfilling the human needs.

2.2.5.1 Energy

Energy is not a human need on its own, it is a requirement to fulfil basic needs. Energy is needed to carry out activities that run the household (Hall, Lambert & Balogh, 2014).

According to Morrissey (2017), access to energy is critical to the QOL of individuals. Energy is needed by households for cooking and heating. Energy extends production hours after sunset by providing light and this provides improvements in QOL. Moreover, energy is needed for the provision of services, such as communication, health, education and other services that enable convenience to the modern community. Some forms of energy generation are a threat to the environment (Morrissey, 2017).

Any energy challenges will affect all activities of human life, and this is critical to QOL. It is central to an individual's wellbeing, as it affects other areas of life, such as water access, agricultural productivity, health access, education services, income creation, adapting to climate change and environmental sustainability. Yet, access to sustainable and modern energy is still a challenge to the developing countries. Hence SDG 7 that targets to ensure universal access to affordable, reliable and modern energy services. The Sustainable Development Goals report of 2018 indicated that there has been some improvement in the energy access of the global community. The number of people with access to electricity in the world increased from 78% to 87% during 2000 to 2016 and the number of those without access to electricity declined to below 1 billion. There was also a remarkable improvement in the developing countries between 2000 and 2016, as the number of people with access to electricity had more than doubled during that period. However, 41% of the global population were still using polluting fuel for cooking in 2016, which is a threat to the wellbeing of the people and the environment (UN, 2018b; Pasten & Santamarina, 2012).

SSA is faced with the challenge of procuring energy sources that are friendly to the environment and for its people. For reasons such as financial constraints, households do not have access to modern and efficient fuels, and are forced to rely on sources that are affordable to them, such as the burning of dung, charcoal, and kerosene. While these may be financially accessible, they are a threat to the environment and affect their QOL (Morrissey, 2017).

Additionally, energy access such as fuel scarcity contributes to food insecurity, since access to energy affects food choices and cooking practices. When the households experience fuel scarcity there are several coping strategies that they resort to that may result in food insecurity. These include choosing foods that require less fuel, avoiding

to cook frequently and skipping meals. Most food crops in developing countries cannot be eaten raw and need cooking. Furthermore, good sources of protein such as legumes require fuel to cook; this may lead to lowered protein intake as food that requires less fuel will be chosen, resulting in nutritional imbalance. Unavailability of fuel therefore affects the type of food, quality and quantity. This could be a cause of malnutrition and contribute to a larger percentage of the global population's nutrition insecurity. Lack of access to cooking fuel may also affect the distribution of funds, compromising procuring of food for purchasing fuel (Sola *et al.*, 2016).

Some forms of energy are not sustainable. The excessive utilisation of biomass (in the form of wood and dung) for fuel has negative effects on the environment, health, agricultural productivity and life experiences of the people. The pollution from burning this matter is a threat to public health and the environment. The environmental effect includes deforestation and forest degradation, and a significant contribution to another challenge, global climate change. Female adults and girls spend some of their time collecting biomass and this may affect their productivity. Productivity and agricultural productivity are affected by fuel scarcity, since time is needed to gather biomass, which could be otherwise used on income generating activities. Furthermore, a low income household must spend money to acquire wood for fuel, resulting in less money available to buy food. Lack of access to energy consequently leads to the use of alternatively affordable forms of energy that may reduce agricultural productivity. Agricultural by-products, such as crop residues and dung that can be used in increasing land productivity and crop yields, become less costly options for households when fuel wood becomes scarce (Sola *et al.*, 2016; Kissinger *et al.*, 2012; Shindell *et al.*, 2012).

Lesotho is renowned for abundant water sources and as a result electricity is mainly generated through hydropower. In addition, the rural population of the country mostly uses biomass fuel for cooking and heating (Lesotho's Ministry of Energy & Meteorology, 2017; World Bank, 2017). The country has a high dependency on imported fossil fuels. However, in terms of energy access, Lesotho is ranked among the lowest in Africa (UNDP, 2017).

There has been an annual improvement since the beginning of the 2000s, but the improvement ceased between 2015/16. Even after the improvement, Lesotho's

energy access is still relatively small. The urban areas have more access than the rural areas since infrastructure for transmission and distribution is more developed in the urban areas. Rural areas represent approximately 10.2% of the grid-served areas and about 47% of the urban areas have access (UN, 2018b; UNEP 2017).

2.2.5.2 Income

When families have means to exchange for access to the fulfilment their needs, their QOL is enhanced. According to the UN (2011), access to purchases of goods and services is an indicator of the household's economic wellbeing. If a family can consume more goods and services, it has a high level of economic wellbeing. This therefore suggests that consumption is an indicator of economic wellbeing. However, consumption behaviours of families differ. Some may not use all their income on accessing goods and services, and they may rather decide to save their money. In this way, if their QOL is assessed on consumption, the assessment will be wrong.

There are conflicting views amongst authors. KPMG (2016) states that while income is important, the QOL index is not determined by income only, but includes other life aspects: socio-economic conditions, environment, and governance. Another view includes the notion that it is important for families to have income for their economic well-being. Happiness is critical to the well-being of individuals. Conventional economics suggest that money can buy happiness, because money is needed to access goods and services that will run the household. Thus, it is assumed that there is a correlation between money and happiness. In line with this, absolute income hypothesis states that people with higher incomes are happier compared to those with lower incomes in the same community (Headey *et al.*, 2004).

The findings of a study in South Africa by Gaibie and Davids (2009) indicate that economic well-being is an important indicator of the level of QOL. This is in agreement with Ball and Chernova (2008) who stated that income levels, whether it is absolute income or perception of income in relation to others, was positively correlated with happiness. Furthermore, they found that it was especially the perception of superiority acquired from the comparison between incomes that contributed to happiness.

Moreover, in a study to determine if higher education is related to QOL, it is mentioned that among other things, higher education results in better employment prospects, higher salaries, and a greater ability to save and invest. These improvements may result in an improved QOL (Bloom *et al.*, 2006). The Department for International Development (2008) states that growth together with access to income, can result in the ability to satisfy the needs of the household. Households are able to pay for education, health care services, transportation and housing. Economic wellbeing and growth therefore encourages human development, which, in turn, promotes economic growth, which should then improve QOL.

Employment is one of the major sources of income and in developing countries, it is the main source of income (World Bank, 2013). On the other hand, unemployment is a major life event and can be devastating (Bloom *et al.*, 2006). Unemployment can negatively affect the individual's wellbeing, other members of their household and the community. The negative effects of unemployment can be severe. Persistent unemployment has extensive effects that may also lead to food insecurity. The effect extends to the prospects of the next generation, since they are unable to pay for services such as health and education (UN, 2011).

While it is important to be employed to obtain income, that is not the only way to get income. There is a need for household income diversification, even more when unemployment is a growing problem in SSA. It also plays a major role in poverty reduction and poverty alleviation. According to Strokes *et al.* (2015), there is a merit in entrepreneurship and it has been acknowledged as a way for entire households to shift from subsistence to sustainability. Entrepreneurship has the ability to enable family members to help their households thrive and have better QOL.

In summary, income is not the only indicator of QOL, however having a stable income is among the most important determinants of QOL. Income can come from employment or other income generating activities. The results of low or no income are devastating and imply poor QOL.

2.2.5.3 Employment

Employment generation reduces poverty and increases the level of economic activities that contribute to economic growth (Fapohunda, 2013). Being employed is an important determinant of living standards around the world. In developing countries, employment is the main source of income and unemployment is the most frequent cause of household poverty. An increase in income improves the wellbeing of the household, enables positive changes and widened choices, such as a reduction in working hours for other causes, such as education, retirement, or family (World Bank, 2013).

Employment creation is expected to contribute to poverty reduction and economic growth. However, Africa's economic growth has not been a result of high job growth rates, since many countries are experiencing high unemployment rates. Women and youth (15–24 years) are the most affected groups. The youth unemployment rate in the African continent is expected to increase from 226 million (in 2015) to 321 million in 2030 (Africa Development Bank, 2018).

The lack of growth in job creation causes delayed poverty reduction. The combination of an increasing economic growth and low job creation, imply that Africa is experiencing jobless development. With the face of rapidly growing populations and increased risks of social unrest or discontent, unemployment growth is a serious concern for African policy makers. There is an urgent need to create enough "good" jobs. This is especially important, because urbanisation in Africa is projected to continue to increase rapidly. In 2015, Africa's urban population was close to 40%. By 2050, more than 60% of the continent will live in urban areas (African Development Bank, 2018).

In Lesotho, the largest employer in the formal sector of the domestic economy is the government. The textile manufacturing sector is the largest informal employer in the sector. However, the high unemployment rate has resulted in a high number of Basotho migrating to South Africa (the main destination for Lesotho's migrant labour) for employment (Damane & Sekantsi, 2018). The levels of unemployment in Lesotho started fluctuating during 1994. Since 1994, the percentages of unemployment have always been higher than 20%. This implies that at least one in five Basotho does not have a job (Shale, 2013).

The 2002/2003 Household Budget Survey indicates that the unemployment rate decreased from 28.7% of the total labour force in 1994/95 to 23.2% (BoS, 2017). In 2008, the unemployment rate further declined to 23%. According to the International Labour Organization (ILO) (year) estimates, the unemployment rate increased to 25.3% in 2009, and was roughly at the same in 2013. This suggests that the government of Lesotho is struggling with job creation for its population.

The youth are the most vulnerable to unemployment and this is a threat to the development and economy of Lesotho. There has not been any major job creation by the public sector or the small private sector, which are also faced with economic challenges. This explains why many Basotho continue to seek job opportunities in other countries, particularly in South Africa. The majority of this migrant labour force do not have sufficient education or skills required to qualify them to acquire employment in other countries, resulting in a high rate of illegal migration in search of employment (Shale, 2013).

In the third quarter of 2014/15, the most employed age groups were: 25 - 29, 30 - 34 and 35 - 39. The 35 – 39 age group had people who were mostly employed in the military and the highest percentage of people in this group and 32% of the 25 - 29 age group were support workers. Those working in the “professionals” category accounted for the highest number of people in the 30 - 34 age group. The less developed private sector puts pressure on the public sector to create employment (BoS, 2017). Some of the factors that lead to the inability to be employed in Lesotho are lack of skills, high prevalence of diseases, especially HIV/AIDS and TB, unwillingness of the government to invest in labour related issues and lack of infrastructure development (World Bank, 2015).

It was also estimated that of the 7,500 graduates who enter the labour market each year, half do not get jobs. Even those who are employed are mainly working in subsistence agriculture, where they do not earn salaries, or if at all very low wages (Central Bank Lesotho, 2012). In 2016, 48.7% of adults in Lesotho were employed with 27.6% working full time and 21.1% casual or part time (Crush, 2016). Yet, unemployment remains high in Lesotho at 27.7%, coupled with high inequality and poverty (World Bank, 2019).

2.2.5.4 Home Industry income activities

Income generation can be a pathway to decreasing food insecurity when economic factors such as unemployment are the main cause of food insecurity. It also enables individuals and households to access food that is available in local markets, when lack of money is the main challenge in accessing goods and services. However, the promotion of income generating activities may not solve all food insecurity situations. The context of a food insecurity situation must be analysed to inform the suitable solution. In situations where unemployment is a major cause of food insecurity, the households are unable to meet their human needs. A long period of vulnerability may result in severe hunger and chronic or acute malnutrition (Action against Hunger, 2009).

Income generation activities contribute to the endeavours to address poverty, unemployment, and lack of economic opportunities for economic wellbeing and secure livelihoods. These activities come in different forms, such as microcredit programs that provide access to financial services and assistance for the poor people who would not be eligible in conventional financial institutions. Microcredit is one form of microfinance, which provides a variety of financial services such as loans, access to savings, credit, and insurance to poor people (Alone, 2013).

Even though agriculture has not been very successful in Africa, it has contributed greatly to the economy of many countries in Asia and it is one of the prospective ways to generate incomes for households. The survival of most people residing in the rural areas in SSA, depends on agriculture. Agriculture has also contributed to the overall economy of the countries and it would be assumed that agriculture plays a major role in development. However, that is not the case, since most African countries did not meet the requirements for a successful agricultural revolution. Furthermore, productivity in African agriculture is lower compared to the rest of the world. This has resulted in a debate within the international development community concerning the role of agriculture in African development, especially addressing food insecurity. There is both potential for increased staple production and evidence to support key interventions. The findings also indicated that, while Africa is faced with new challenges, unlike those faced by Asian countries, there is little evidence to suggest

that agriculture cannot play a major role in its economic development (Diao *et al.*, 2010).

The delay in the reduction of food insecurity has been a result of poor agricultural productivity, rapid population increase, political instability and civil strife. However, challenges and achievements differ with regions, and the success achieved in countries with stable political conditions, economic growth and expanding agricultural sectors, suggests that there is a way to improve food security on a long-lasting and sustainable basis (FAO, 2016a).

The prioritisation of the agricultural sector in the development agenda shows its pivotal contribution to food security. The Comprehensive African Agricultural Development Programme (CAADP) contributes significantly in the New Partnership for Africa's Development (NEPAD) and the effects are reflected in the contribution of the agricultural sector to total GDP, which is evidently high globally. The crucial role of the agricultural sector to the GDP reflects less diverse streams of economic development in Africa. In Botswana and South Africa, the agricultural sector contributes 15% of the total GDP. Agriculture employs more than half of the total labour force and provides means to earn a living for small scale farmers in the rural areas (FAO *et al.*, 2015; IMF, 2012).

In Lesotho, a study was undertaken to assess the relationship between the households' involvement in urban agriculture and improved food security in Maseru. The findings indicated that the relationship between the engagement of the households in urban agriculture and food security is inconsistent and statistically insignificant. It was observed that the food security of the middle income households was not significantly related to their involvement in some agriculture practices. Furthermore, the findings reported that the identified benefits of urban agriculture were seemingly dependent on household income. This study therefore implies that a general approach to addressing household food insecurity may not yield the best results (Crush *et al.*, 2017).

Other income generating activities that can improve the wellbeing of households are enterprises. Household enterprises provide means for income-generation and employment for people who do not get their income from agriculture or paid jobs. It is suggested that the means of providing income by household enterprises can be

categorised into three types: supplementary income, steady income through employment and entrepreneurial (where income comes in the form of profits/surplus). From Abbott *et al.* (2012) view, if poverty is to be intensively addressed and new entrants to the labour market are to be accommodated into productive employment, then a robust assistance needs to be given to the start-up and sustaining household enterprises. “A non-farm household enterprise is an owner-operated business that is normally in the informal sector” and has no employees that are regularly paid workers. Other family members may contribute without expecting to be paid. According to Gordon and Craig (2001) ‘non-farm’ refers to “activities that are not primary agriculture, forestry or fisheries but does include trade and the processing of agricultural products even when undertaken on the farm”.

According to Adenutsi (2009), entrepreneurship is another form of generating income, as it has been stated. Entrepreneurs are able to generate a good income, as they often make profits from their ventures. Entrepreneurship also speaks to the alarming unemployment rate in developing countries as self-employment, which is often comparatively satisfying and flexible. Entrepreneurship also reduces the rate of migration and unemployment by creating jobs for others. Entrepreneurship is a means of income generation that drives economic growth and development (Adenutsi, 2009).

Ghana, like many other African countries, is faced with the challenge of many youths that are unemployed. The Ghana Statistical Service report on labour force (2013) reported the unemployment rate of Ghana at 5.2%, with the unemployment rate among the youth (15–35 years) at 32.2%. The report further indicates that unemployment is higher in the urban areas (6.3 %) and lower in the rural areas (3.9%). The wholesale, retail businesses and low productivity service areas have employed the majority of the youth in urban areas (Ghana Statistical Service, 2013). The population of the youth in urban areas continues to grow as the youth in the rural areas, who are involved in low productivity agricultural activities, migrate to the cities to seek better opportunities to earn a living. Given the lack of skills and education among most youth in the rural areas, it has been suggested that non-farm enterprises can create the much-needed jobs in rural areas (Lambon-Quayefio, 2017).

Income generating activities have been existing in Lesotho. In a study that assessed the contribution of income generating activities to sustainable rural livelihoods for

young southern Africans, Lesotho and Malawi youth were respondents. It was reported that expanded vocational and business training, focusing on locally relevant types and scale of businesses, together with assistance to raise start-up capital, has the potential to improve poor young people's ability to generate income and have secure livelihoods (Hajdu *et al.*, 2011).

In a research that assessed the impact of income generation projects on rural livelihood transformation, it was reported that the income generation interventions improved the QOL of the people. People had income that enabled them to also procure food, which then improves food insecurity. These interventions provide a supplementary income that enables them to afford other needs that they could not afford to fulfil. However, there is a need for a sustainable assistance to the income generation programmes from various external institutions such as universities, research institutions, financial institutions and Rural District Councils (Ismail & Ainebyona, 2018).

2.3 THE FOOD SECURITY CONSTRUCT

Food security is a multi-faceted and complex construct, emphasising a multi-disciplinary approach. In order for food security to exist, access to food, availability, utilisation and stability of food, should be addressed (Gibson, 2016). While global food production is improving, there is unequal distribution of the food, and in some instances the available food is not culturally acceptable, rendering a large portion of the world's population in a food crisis. Due to globalisation, advances in transportation and storage technology, food can be moved across borders and continents. Furthermore, consumers tend to adopt the 'global diet' with cultural adjustments. Local food access differs greatly and the difference is more evident between developed and developing countries (Hazell & Wood, 2008; McCloskey, 2012).

2.3.1 What is Food Security?

The term food security became clearly noticeable after the World Food Conference in 1974. The 1974 Rome conference resulted in the holistically evolving, developing, multiplying and diversifying of the concept (Maxwell, 1996). It is estimated that there are almost two hundred definitions of food security (Smith *et al.*, 1993), which suggests

that there are different approaches to it. Among these definitions is the United Nation's Rome Declaration in 1996 during the World Food Summit observed that, "Food security at the individual, household, national and global level exists where all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Kharkwal & Shu, 2009). Food security was further emphasised by the commitment of the world leaders' fight against extreme poverty through the MDGs (Demi & Kowornu, 2013).

Food security has therefore been defined by various organizations and researchers, however notable among the definitions, is the one provided by the World Bank 1986, which defined food security as "access by all people at all times to enough food for an active and healthy life" (Kharkwal & Shu, 2009). This definition was revised by the FAO to cover the nutritional value and food preferences. Thus, a broadly accepted definition was established during the World Summit organised in Rome in November 2006, where food security was defined as "a situation that exists when all people at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2006). This definition consequently addresses the following needs: food availability, food access, nutritional value and the cultural acceptability of the food.

2.3.2 Pillars of food security

Consequently the FAO suggested a four-pillar model: availability, access to food, utilisation and stability/vulnerability. In order for food security to exist, all four pillars should be addressed. If one of these pillars are neglected the country, community or individual, might be rendered food insecure (Gibson, 2016). The four pillars are subsequently discussed:

2.3.2.1 Availability

The components of food availability are the quantity, quality and safety of food, together with the cultural acceptability and preferences of the consumers (Leroy *et al.*, 2015). Availability of food can be affected by factors, such as transport for getting food to households, land to grow food, energy to prepare the food and water needed in

preparing the food at all levels (FAO, 2006). Food availability incorporates the supply side of food security and is affected by the level of food production, stock levels and net trade. It is achieved when adequate quantities of safe and nutritious food are consistently available to individuals within a country, or accessed within a reasonable distance, or within their reach, and meet their food preferences. Sufficient quantities of the appropriate and necessary type of food can be ensured through domestic production, commercial imports or food assistance (Sassi, 2018). The domestic agricultural output and net food imports contribute to food availability at the national level.

Food availability can be measured at individual, household, community, regional, national and global level. Food security at the individual level is when there is enough food consumed to meet the body's requirements and this is also measured by the energy requirement. At the household level, food security is achieved when the household has the ability to procure food and all the resources needed to meet the household's energy requirements. Regional/national food security occurs when food availability is met in terms of balancing the food demand and supply and purchasing food at fair prices. Lastly, the global level of food security requires the global food production to be sufficient to feed everyone (Sassi, 2018).

A country or region's food availability can be measured with the use of its DES (dietary energy supply), which takes all production and imports, subtracts the amount that is exported and wasted/lost and calculates an average per person (in Kilocalories (Kcal)) for the country (Roser & Ritchie, 2013). SADC (2014) reports that, in spite of the efforts to cover the food deficits through aids and food imports, the SADC average per capita dietary energy supply is at an estimated 2,160, which is below the recommended requirement of 2,700 Kcal. The protein supply is 49 g per person per day, which is below the requirement of 68g. In Lesotho, even in good yields, the food produce is not sufficient to meet the national requirements. Factors such as droughts, unseasonal snowfall, frost, flash floods, extreme temperatures and hailstorms experienced in different parts of the country, damage the crops and affect the harvest (LVAC, 2018).

2.3.2.2 Access

This involves the availability of the sufficient resources to procure means for acquiring enough quantities of foods with nutritious value. It incorporates the financial access, distribution of food, and meeting the preferences of individuals and households. Food access is both economic and physical. Economic access is determined by the country's ability to generate foreign exchange to procure food through importing. Physical access is related to the state of infrastructure, access to market and storage facilities, political stability and income distribution patterns within the household. It is dependent on the adequacy of income to buy food at the current prices or possessing enough land and other resources needed for household food production. Households with enough resources are not substantially affected by unstable harvests and local food shortages and maintain their access to food (Sassi, 2018; FAO, 2006).

Access to services and markets contributes to the QOL and food security of poor rural households. Without good access to markets, a household with less resources cannot market its produce and generate income. Equally important, it cannot utilise its limited resources, such as land efficiently. Access to markets is essential and is a prospective means to alleviate poverty. While there are many ways that markets contribute to improving the wellbeing of the households, it is crucial to have the relevant assets required, to make effective use of these markets, especially public transport (Taylor *et al.*, 2008).

Food access can be measured from individual to global level. The components of food access are similar to those of food availability. The components are the quantity, quality, safety, cultural acceptability and preferences of the consumers (Leroy *et al.*, 2015). The two concepts of financial access (the ability to pay for healthy nutritious food) and food awareness (the knowledge and skills needed for food preparation and cooking) are also central to food access (Lê *et al.*, 2015).

2.3.2.3 Utilisation

This pillar entails the utilisation of food through a nutritional diet, access to health care, water and sanitation to achieve a state of nutritional well-being where all physiological needs are met. Food security is achieved when the ingested food is safe and meets

the physiological requirements of each individual. Thus, utilisation refers to the ability of individuals to absorb and use the nutrients ingested, for the regulation of the body (FAO, 2006). Other authors agree that utilisation is the effective biological use of food that meets the energy requirements, essential nutrients, access to clean drinking water and improved sanitation facilities. It suggests that households must have knowledge on food preparation, storage and processing techniques (Sassi, 2018; FIVIMS 2003; Riely *et al.*, 1999).

Barrett (2010) adds that utilisation also reflects on the food choices of individuals and households. It addresses their ability to buy nutritionally adequate food or foods with no nutritional value. The proper preparation and safety of food is important to retain the nutrients in the food. The health status of an individual must enable the maximum absorption and metabolism of the needed nutrients. Utilisation places great importance on dietary quality, especially micronutrient deficiencies associated with inadequate intake of essential minerals and vitamins.

2.3.2.4 Stability

Food security occurs when there is access to adequate food at all times. Vulnerability and stability is used as a risk management tool and forms the basis for all other pillars. Stability of accessing food can be affected by climate change, economic factors, political instability, conflict and war (FAO, 2006). Stability occurs when there is an adequate sustainable supply of food, with sufficient food available, which can be accessed and utilised at all times without being worried about not having food during certain seasons or due to external events (Leroy *et al.*, 2015). When the other three pillars of food security (availability, access and utilisation) are achieved, then food security exists. It is complementary in nature to achieve food security. Food utilisation, for example, is an input to achieving food access for all, through its implications on health, nutrition and more generally, human capital, and access is at the basis of food availability, otherwise natural, human and capital resources are likely subjected to depletion (Webb & Rogers, 2003).

2.3.3 Measurement of food security

The five methods that are mostly used for the assessment of food security are: dietary intake of an individual; anthropometry; experience-based food insecurity measurement scales; household income and expenditure surveys and the method for estimating calories available per capita at the national level. These methods are used jointly and are chosen depending on the objectives and the financial and logistical resources available to collect valid data (Pérez-Escamilla & Segall-Corrêa, 2008). As such, the holistic measurement of food insecurity cannot be captured by only one indicator. An example is that a household's level of food insecurity or hunger will be informed by obtaining information on a variety of specific conditions, experiences, and behaviours that serve as indicators of the varying degrees of severity of the condition (Bickel *et al.*, 2000).

Food security can be assessed at individual, household, community, national, regional, and global levels. The complex nature of food security makes it difficult to measure, as it cannot be characterised or limited by geography nor determined by one variable such as gender, age, household size, education level, geographic location or income levels (McCarthy *et al.*, 2018).

Currently, 16% of the global population are faced with chronic hunger in a time when there is more than enough food to feed the entire population on the planet. The challenge in achieving food security is brought by the inability to address the food distribution and increasing food shortages, caused by a combination of waste and the consistent population increase. Considering the prevailing food security situation, predictions state that global food production must be increased by 70% by 2050 to fulfil in global demands. Furthermore, this needs to happen on already over-exploited finite infrastructures and resources (McCarthy *et al.*, 2018).

In most instances, the food security parameters are used to identify potential vulnerable groups, whereas food insecurity, measures the extent to which people suffer from not having enough. The difficulty to measure food security is also brought about by its broad relationship with the production, distribution and consumption of food. In measuring food security, it must be noted that food security and famine and hunger are not the same: famine and hunger are the effects of food insecurity. An analysis of food security will assess the occurrence of a change from security to

insecurity or insecurity to security and the probability of such a change happening. Factors that contribute to food security are food availability, food access, proper utilisation of food and stability (Gibson, 2016; Napoli *et al.*, 2011).

Household food security is determined by indicators such as the household location (rural or urban), the household density (the number of people living and sleeping in the same household for more than 5 days a week), and the economic status of the household (the source of income), health status of the occupants, food production or employment status of the breadwinner(s). These indicators are further influenced by other indicators such, the distance of the household to basic services, whether the house is in a formal or informal settlement, the health and education status of the breadwinner(s) within the family as well as the presence of one or both parents within the household (Labadarios *et al.*, 2009).

There are four constructs that were given by individuals indicating their experiences of food insecurity at household level. These constructs were; a) the quantitative aspect of having enough or sufficient food, b) the qualitative aspect concerning the types and diversity of food, c) psychological aspect of food insecurity accompanied by feelings of deprivation or restricted choice for amount and types of food in hand and in household stores and d) the social aspect where an individual evaluates his or her own food situation in terms of generally accepted social norms such as eating 3 meals a day or being able to purchase without having to beg or rely on charity (Radimer *et al.*, 1990).

Experience and perceptions are included in the description of food insecurity, since they reveal the experiences of the households and individuals when there is uncertainty about the future food availability and access, inadequacy of the amount and kinds of foods (quality) needed to maintain a healthy lifestyle, or the need to use coping strategies when food is not enough (National Research Council, 2006). This definition appreciates the perceptions on food insecurity and “feelings of deprivation” in individuals. The consequences of food insecurity may result in the adoption of behaviours that can deepen the existing poverty or extend it to the next generation. Some of these strategies compromise the nutrition of the individuals, thus affecting productivity and health. This is mostly undesirable for the most nutritionally

vulnerable household members, such as children, pregnant and breastfeeding women whose nutrient requirement is higher (Leroy *et al.*, 2015).

2.3.4 Causes of food security

There are numerous causes of food insecurity. The following were identified as the main causes of food insecurity in the Southern African Development Community (SADC) region.

2.3.4.1 Adverse climatic conditions

The state of climate change leads to delay in attempts to achieve global food security. It results in higher temperatures, more frequent extreme weather events, water shortages, rising sea levels, ocean acidification, land degradation, droughts and floods. These events could seriously compromise agriculture's ability to improve food security, delaying progress towards the poverty reduction (FAO, 2016a). The SADC region has experienced extreme drought from 2014 to 2016, mostly affecting the rain season in 2015/16. This was a result of the worst El Niño Southern Oscillation (ENSO) episodes ever recorded, that hit the region (SADC, 2016).

Consequently, in Lesotho, the humanitarian needs are on the increase, as the country is experiencing the effects of the El Niño that include drought, poor rain seasons and very low harvests. Farmers were unable to plant, due to the dry conditions experienced during the planting season (August - December 2015). The minority of the farmers that attempted to plant experienced water stress, heat and failed germination. The 2015/16 drought was the most intense of all that have been recorded to have hit the country (FAO, 2016b). The after-effects of these events are still experienced. The unpredictability of such events make the harm done by it so much bigger (Reliefweb, 2018).

Lesotho is vulnerable to the impact of climate change, with high exposure to climate variability and extremes, which are predicted to intensify in the future. Climate change and variability, together with soil erosion, human induced degradation through poor farming practices and overgrazing, have led to a loss of nearly 800km² of arable land

in the past decade, leaving only about 9.6% of the total arable land. Moreover, there is increasing competition for the limited arable land remaining (Ministry of Local Government and Chieftainship, 2018).

2.3.4.2 Economic problems

Food commodity prices have two distinct effects, brought on by international market prices and domestic prices. The effect of international market prices is at the national level, where macroeconomic factors, such as exchange rates, balance of payments and budget deficits are affected. Domestic prices have an impact at household and individual level where the energy intake, nutrition and poverty of the households and individuals are affected. Over the past two or more decades, the countries of Southern Africa have struggled to develop their economies and achieve food security. It was also a challenge to create job opportunities and sufficient income to allow their citizens to build livelihoods that would boost their standard of living beyond the poverty line. When the national economy is poor, one of the immediate consequences is food insecurity, since factors such as unemployment, high food prices, inflation and increasing external debt negatively affects and delays progress towards achieving food security (Abdalla, 2007).

High unemployment has become a distressing issue in developing and developed countries. Lesotho is faced with a persistent growth of unemployment, which has over the past 10 years, ranged between 23% and 28%. This suggests that about a quarter of the country is unemployed, which is coupled with high income inequality and poverty. Among the factors that have resulted in this predicament are: the small and undeveloped private sector that cannot employ a significant proportion of Lesotho's labour force, labour market deficiencies and domestic markets that are not diversified (Damane & Sekantsi, 2018).

2.3.4.3 Mismanagement and poor governance

Corruption has been suspected to be accountable for some of the socio-political problems that are worsening food insecurity. Some studies sought to compare the influence of corruption on food security, life expectancy and population in developed

and developing countries. The results indicated that the Corrupt Perceptions Index (CPI) had a significant positive relationship with the Global Food Security Index (GFSI) and life expectancy in least corrupt countries, not most corrupt countries. There was also a significant relationship between the GFSI and life expectancy in most corrupt countries. Low CPI's influenced high GFSI's and life expectancy in the least corrupt countries, while low life expectancy was associated with low GFSI's in the most corrupt countries. Policies discouraging corrupt practices and promoting good governance should be embraced to eradicate food insecurity in developing countries (Uchendu & Abolarin, 2015).

While Lesotho has made progress in developing its policies that are related to nutrition and food security, the implementation of these policies are still a challenge. The implementation of policies that will make an impact in the relevant field, requires stakeholders to robustly strategize and put into place monitoring systems that will track progress. There is a need for true commitment from the involved parties (government, policy makers and public institutions) to ensure that execution of policies takes place. The use of regulations and frameworks will help to solve the lack of implementation that stalls the development of food and nutrition security in Lesotho (Reliefweb, 2018).

In addition, the budget system in Lesotho is among the least transparent globally and this affects development across all sectors. The budget information can be made available to the public to improve accountability to citizens that pay tax and stakeholders. This would invite suggestions and inputs from the society to contribute towards the improvement of the economy and reducing the debts of the country (UNICEF, 2018).

2.3.4.4 HIV/AIDS

The rapid spread of AIDS contributed to the increase of health problems and food insecurity in African countries and led to negative economic consequences. Households are faced with high health expenditure and low productivity. Affected family members responsible for income or agricultural work who are infected with this disease, negatively impact on productivity and income generation and available household resources. Thus compromising their own, as well as household members' food and nutritional security status. The income should instead have been spent on

food, household expenditure, investment and thus general wellbeing. As a consequence, agricultural production and the level of nutrition declined, contributing to the existing food insecurity challenge (Al-Baguri, 2014).

The UN Lesotho (2017) reported that 7 countries in eastern and southern Africa accounted for more than 80% of the number of new infections, AIDS related deaths and prevalence of HIV during 2015. Furthermore, the 7 countries with the highest burden of new infections, include Swaziland and Lesotho, both with a higher burden than South Africa. Lesotho also has the highest burden of AIDS related deaths, with more than 80% of AIDS related deaths. Lesotho also ranks first in TB globally and has a high HIV and TB infection of 72% (UN, 2017).

Testing and treatment of HIV and AIDS has remarkably improved in recent years, but HIV stigma and discrimination together with poverty and gender inequality remain major challenges to prevention of HIV in Lesotho. Consequently, the life expectancy has gone down to 52 for men and 55 for women. Despite the progress that has been made in some areas, there are still many barriers to address.

2.3.4.5 Poverty

The slow economic growth in southern Africa has contributed to the delay in reducing the high poverty rate. It is reported that during 2010–15, Malagasy had one of the highest (78%) percentages of people living below the national poverty line of \$1.90 a day, followed by Malawi (71%), Zambia (64%) and Lesotho (60%). Mauritius has the lowest percentage (10%) of people living below the national poverty line. Lesotho (159), Mozambique (180) and Malawi (171) ranked lowest on the Human Development Index in 2017, while South Africa (118), Botswana (101) and Mauritius (65) ranked highest (African Development Bank, 2019). This indicates that Lesotho has a high percentage of people living in poverty.

Poverty, inequality and the rising number of undernourished people continue to pose serious challenges in Lesotho. As a result, the 2017 Global Hunger Report ranked Lesotho 80 out of 119 countries that were assessed. Lesotho is one of the poorest countries in sub-Saharan Africa, with about half the population (over 1 million people) living in poverty. Of this number, about 34% are extremely poor, living below the

national food poverty line of M138 per adult per month (about US\$10). Poverty together with a very high prevalence of HIV (25% among adults) and a high overall unemployment (27.7%), have contributed substantially to food insecurity (World Bank, 2019; UNDP, 2017).

2.3.4.6 Southern African population growth

Rapid population growth results in an increased need for food, which is faced with the inability of the agricultural production to meet such increase. Consequently, this puts pressure on the agricultural resources in the state, represented in the fragmentation of agricultural property and the destruction of agricultural land, which in turn cause low agricultural productivity (Al-Baguri, 2014).

Additionally, the consequences of urbanisation, controlled and uncontrolled, are similar to those brought about by general population growth. The prevailing migration of people from less urban to more urban areas, in order to find new job opportunities, has unpleasant results. This includes foreign nationals who also migrate in search of such opportunities and also create new business (Aiyuk, 2017). Maseru is experiencing rapid urbanisation, which has resulted in rapid growth with citizens moving to the urban areas for better livelihoods. While jobs and facilities may be concentrated in the city, it lacks enough capacity to absorb these migrants. There is, hence, an increase in unemployment and poverty escalation in Maseru (Mots'oene, 2014).

Other causes of food insecurity, include political instability, war, violent conflicts, poor agricultural developments, agricultural inputs and increased food prices. It is important to note that these causes must be assessed in depth to achieve food security, improved nutrition, and to promote sustainable agriculture globally (Pérez-Escaramilla, 2017).

2.3.5 Effects of food insecurity

Food insecurity affects health of all age groups, but especially the growth and development of children. In the developing countries, an estimated 13 to 18 million people, mostly children, are stunted both physically and mentally as a result of hunger, malnutrition and poverty-related causes that leaves them in need for assistance. One

billion people (20% of the global population), mostly in developing countries, live in households too poor to obtain food necessary for sustaining normal work, due to rising food prices. Approximately 500 million people live in households too poor to obtain the food needed for healthy growth of children and minimal activity of adults (Ilaboya *et al.*, 2012).

The estimated population of Lesotho is 2.13 million (Lesotho Population, 2019) and food insecurity has accelerated the burden of malnutrition (under and over nutrition) and micro-nutrient deficiency within all age groups. Stunting is at 33.2% and the proportion of underweight children has decreased, however low birth weight remains steady at 9.4%. Wasting has decreased from 6% and 5% in (2004 and 2009 respectively) to 3% in 2018. The prevalence of obesity is on the rise with 7% in children under the age of five years, 45% of women and 12% of men aged 15 to 49 year being overweight. The inadequate intake of micro-nutrients, such as iron-folic acid and vitamins, contribute to various health related conditions (Reliefweb, 2018).

In addition, Lesotho has a high dependency on imported food that further subjects vulnerable households to high food prices with negative effects on households' nutrition and food security situation. Households with none or low income, especially those who reside in the rural areas, struggle to meet their minimum daily requirements for food intake, as they can only afford poor quality foods with low nutritional content. The most vulnerable groups that are substantially affected, are the households that are headed by women and children, those with fewer employment opportunities and few assets and those that rely on low productive agriculture with low earnings, herding and informal business or temporary/casual employment to earn incomes (Reliefweb, 2018).

Food insecurity is one of the factors that may contribute to political instability. When food insecure people express feelings of vulnerability, anxiety and stress, their productivity is also affected. Low productivity negatively affects household income, consequently disrupting household dynamics, because of the preoccupation with procuring food. Such citizens are highly likely to be angry and irritated (Fawole *et al.*, 2015).

2.3.6 Ways in which food security can be improved

Researchers and other stakeholders have consistently worked on the way forward for the persistent food crisis in the SSA region. In order to alleviate the effects of food insecurity on the people, there should be proactive actions on the side of the leaders, with a view to protect their people from being subjected to the effects of food insecurity. To achieve food security, the following were suggested as ways of reducing the incidence of food insecurity in African countries (Fawole *et al.*, 2015).

2.3.6.1 Consistent Policy Framework

Poor policies have greatly affected the food security in Africa (Mwaniki, 2006). The challenge with food security has deeper roots in developing countries than is usually appreciated. Colonial agricultural policies of the past were such that food production was not given a priority at central government level, in many countries (Abdalla, 2007). Therefore leaders need to make unique policies that appreciate agricultural production and adhere strictly to these policies. These policies must be subjected to periodic review by experts, enabling improvements with successive governments (Fawole *et al.*, 2015).

2.3.6.2 Population Control

In many African countries where poverty is severe, population is majorly uncontrolled. The methods of achieving controlled population, such as contraceptives is still unpopular, especially in the rural areas. The lack of education consequently results in a rapid population growth, which leads to competition for sufficient food. Government and other development partners, such as the World Bank, UNICEF, FAO, WFP and others, should work together to assist the government in educating people on methods of birth control. When the people are educated, then policies can be appreciated (Fawole *et al.*, 2015).

2.3.6.3 Building community resilience

Rising food prices mostly affect vulnerable households and can intensify poverty with effects that can be irreversible. This is because their nutrition tends to worsen, they experience lack of access to education services and productive assets are sometimes sold to get the means to survive. High food prices are worsened by climate change, natural disasters and environmental degradation, as well as impacts. Climate change is accountable for about two-thirds of disasters that are continuing to increase. Joint efforts to support the most vulnerable households can reduce the high prevalence of chronic food insecurity. The social protection systems that are being implemented in African countries are yielding positive results (AusAID, 2011).

2.3.6.4 Humanitarian support: saving lives and livelihoods

While it is important to find long-term means to productivity and resilience, the increasing weather-related crises must be robustly attended to. The effects of El Niño have had a substantially negative impact on food security and development in Africa. Therefore there is a need for early, well-coordinated interventions that save lives and livelihoods and prevent crises from increasing (AusAID, 2011).

2.3.6.5 Provision of Storage Facilities

Food is wasted in African countries during the harvest season, mainly due to insufficient processing and storage facilities. Governments and stakeholders should do everything possible to ensure that there is adequate support or provision of processing and storage facilities for agricultural products so that there will be all year round food security and in turn boost the income level of farmers, thereby reducing poverty, which is the ultimate goal of any other African government (Fawole *et al.*, 2015).

2.3.7 The link between Food Security and Quality of Life

Sustaining good health, dealing with a chronic disease and having a nutritious diet, or a combination of these, can be challenging to those that are faced with food insecurity

or poverty. Food insecurity is associated with resource related challenges, such as lack of access to safe water and improved sanitation, access to health services, as well as access to energy and shelter. This is a result of limited finances and resources, competing priorities, and stress. These are basic needs that determine QOL. These challenges in turn, can contribute to poor nutrition, health, and disease management, suggesting that there is a relationship between food security and QOL (Hartline-Grafton & Dean, 2017).

The link between food security and QOL can be mostly seen within the utilisation pillar of food security. This pillar deals with the utilisation of food through adequate diet, clean water, sanitation and health care, to reach a state of nutritional well-being where all physiological needs are met. In order to achieve food security, the food ingested must be safe and must be enough to meet the physiological requirements of each individual. As it has been stated, health, water and sanitation are central to QOL, while they are also critical to achieve food security (FAO, 2006).

The consequences of poor nutrition, food insecurity and poverty are detrimental to the well-being and health of all members of the household. The effects are more severe on the vulnerable groups such as children, pregnant and breastfeeding women. The households are at a greater risk to experience chronic diseases and poor general health. The consequences also have financial implications for the households, since money is needed to pay for health care services. This therefore supports that there is a relationship between food insecurity and QOL (Hartline-Grafton & Dean, 2017).

There are numerous studies reporting on the relationship between food security and health related QOL. One study sought to determine the relationship between the QOL of pregnant women and food security. The findings indicated that when the households' food insecurity worsens, the QOL of pregnant women decreases significantly. This is because household food insecurity affects the food consumption pattern and compromises the dietary diversity. Consequently, the QOL of the pregnant women will be affected as their nutritional requirements may not be met (Moafi *et al.*, 2018).

Another study investigated the relationship between the food security status and health related QOL of persons living with HIV. It was reported that very low food

security is strongly associated with physical and mental well-being of people living with HIV (Hatsu *et al.*, 2014).

Baptista *et al.* (2018) aimed to investigate the potential determinants of the QOL and functional status (an individual's ability to perform normal daily activities required to meet basic needs, fulfil usual roles, and maintain health and well-being) in the elderly who are experiencing food insecurity. The findings revealed that within the sample of the elderly population who are food insecure, there is a significant relationship between functional status, mobility and QOL. The symptoms of depression and family income are also associated with health-related QOL (Baptista *et al.*, 2018). Similarly a study aimed to examine the association of household food insecurity, identified with self-reported child health-related QOL. The findings complemented the previous finding by stating that while research to date does not allow understanding as to whether food insecurity is an independent cause of negative child health-related QOL, it can be concluded that food insecurity is independently associated with negative child health-related QOL (Casey *et al.*, 2005).

Researchers further sought to determine the relationship between food insecurity and health-related QOL, reported by racial/ethnic minority patients with cancer. Food insecurity was associated with lower QOL in this sample of under-served racial/ethnic minority patients with cancer. Under-served ethnic minority patients diagnosed with cancer are a vulnerable patient population, at significant risk for inadequate food access and the related lower QOL (Gany *et al.*, 2015).

Although many of the studies have been done on vulnerable groups, it can be concluded that when any group of people are food insecure, their QOL is adversely affected. While the QOL in the above studies is related to health only, this study will make use of other indicators, including health, water and sanitation. Although health is included in the measurement of QOL, it is not the scope of this study to measure the technical medical indicators of health.

2.3.8 Food Security and Agriculture in Lesotho

Lesotho, like many developing countries in the Sub-Saharan Africa region, is faced with food insecurity challenges. The HIV/AIDS epidemic, among other health

challenges remains one of the factors that have resulted in low productivity. Agricultural production is also greatly affected by the climate change that has led to poverty and malnutrition. The country continues to experience challenges related to food availability, access, utilisation and stability (UNECA, 2018).

2.3.8.1 Food security in Lesotho

Lesotho is known in the global media as a country that is burdened by food insecurity. The deliberations in the recent decades on the causes and ways to eradicate food insecurity in the world, have focused on household food production and the rural population. The International Federation of Red Cross (IFRC), for example, recently attested that “persistent food insecurity continues to be a chronic problem in Lesotho and a key obstacle in the country’s development agenda.” Among the interrelated factors that are worsening the food crisis, are climate change and extreme weather events, droughts, which have led to crop failures, declining range-land conditions, excessive soil erosion, chronic poverty and the effects of HIV on productivity (Crush, 2016).

Lesotho has a general shortage of food, hence addressing food insecurity is critical to the development of the country. The majority of the population is experiencing food insecurity, which is mostly prevalent in the rural areas, where households mainly depend on subsistence farming and other rural non-farm activities. Therefore, it is imperative for the government of Lesotho to give the eradication of hunger and under-nutrition the highest priority in the attempt to meet the national vision 2020 goals, as stipulated in the Food and Nutrition Security Policy (FNSP) of 2017 (Reliefweb, 2018).

Lesotho was originally admired for fertile land and its farm industry. During the 1920s Lesotho was a net food exporter, although that has since ceased, the reality now is that most households depend on income for their livelihoods. Throughout the 20th century, the South African mines have been a source of income. The number of Basotho men working in those mines has halved since the early 1990s. Over the same period many garment factories have been opened in Maseru and other towns and created employment for women. Livelihood strategies have diversified and now depend at least as much on women’s wage-earning ability as they do on men’s (Boehm, 2003).

The population in the highlands of Lesotho relies mainly on subsistence farming with a relatively low agricultural harvest. This part of the country is remote and far from urban services and facilities, making the people living in the highlands poorer than those who live in the lowlands (Reliefweb, 2012). Consequently, a higher proportion (48%) of rural households procure food on credit, compared to urban areas (30%), indicating higher prevalence of food insecurity in rural areas. Additionally, in June 2016, the findings of a study revealed that the population in the rural areas was still generally poorer than the urban areas. While both are adopting coping strategies, it was reported that an estimated 50% of the rural population borrows or buys food on credit, making this strategy the mostly used. Some households adopt intense strategies, such as selling animals or withdrawing children from school (WFP, 2016).

Lesotho also has a high prevalence of HIV, ranking second highest after Eswatini. In 2017, 23.8% of the population was HIV positive. Out of the 2 million citizens, 320 000 of them lived with HIV and AIDS related illnesses and accounted for 4900 deaths. This has affected the productivity of the infected citizens and their relatives, as the sick members need to be taken care of. A part of their income is also directed towards access to health care services. This in turn intensifies food insecurity, leads to poor well-being and stalls economic development Lesotho (AVERT, 2018).

Household income plays a crucial role in accessing the services and needs of the family. The findings of a survey done in 2015, indicated that the mean household income during the month prior to the survey was LSL700. This suggests that most of the households had an income of less than USD87 or about USD2.90 per day. This works out to USD0.60 per person per day on the basis of a mean household size of 5, and this is below the USD1 a day poverty line of the World Bank. Employment was the main source of income for most households: 39% had formal employment and 39% had informal employment. Only 14% of the households earned a living from the informal economy. Other sources of income were remittances from South Africa, which were received by 15% of the households and social grants that were received by 13% of the households. Most households (90%) had a supplementary income, and some (42%) had as many as four or more means of generating an income (Crush, 2016).

The findings of a study done in Maseru, indicated that poor households have three major sources of food: small shops, supermarkets and the informal food economy.

Small shops are the mostly used source, followed by supermarkets, then the informal food economy, which is showing growth as it is a source for approximately 50% of households. Urban agriculture is a source of non-purchased food and is used by 47% of the households, but it is not fully explored as only 21% make use of this source at least once a week. Only 2% of households obtain any income from the sale of urban agricultural products. Together, this data indicates that the majority of households do not engage in urban agriculture as a food source (Crush *et al.*, 2017).

In summary, food security in Lesotho has been greatly dependent on agriculture. However, the contribution of agricultural outputs to sustain food security in Lesotho, has been negatively affected by the HIV/AIDS epidemic, economic challenges and climate change.

2.3.8.2 The role of Agriculture in preventing food security

Poverty is most severe in the rural areas where the majority of SSA's population resides. Since almost all rural households depend directly or indirectly on agriculture, and considering the sector's large contribution to the overall economy, it might seem obvious that agriculture should be a key sector in development. However, while agriculture has contributed to poverty reduction, growth and development of the economies of many Asian countries, this has not been the case for Africa. Most African countries have failed to meet the requirements for a successful agricultural revolution, and agricultural productivity in African countries is lower than the rest of the world. This is prominent in Lesotho as well as elsewhere in Africa (Crush *et al.*, 2017).

One of the challenges that affects development of agriculture in Africa, is high dependence on international markets for food. The African continent needs to direct a substantial investment towards agricultural development to address food insecurity. The use of regional markets will also assist Africa in the development of the agricultural sector and contributing to the global economy (NEPAD, 2013). The agricultural markets in sub-Saharan Africa have been mostly unsuccessful in making a large economic impact. The failure has been brought by poor infrastructure and corruption, among others (Dillon & Barrett, 2014).

Climate change has also contributed to the failure of agriculture in Africa. Droughts and floods result in low agricultural outputs and poverty. The occurrence of these natural disasters have increased rapidly since the early 1990s. As a result, it was concluded that in some regions low agricultural harvest has been mainly caused by weather shocks and droughts (FSIN, 2019).

According to Brookes *et al.* (2013), one of the challenges that Africa is faced with, closely related to food insecurity, is unemployment. There is a growing number of educated young people who are unemployed. Agriculture still has a potential to address these challenges. Agriculture has the ability to create employment, although farming has not been appreciated by policy makers as a solution to the challenge of job creation. Regional markets for food are booming, and tight global food supplies create high prices and active export markets. However, for agriculture to present good job opportunities, there is a need to overcome the constraints that delay growth of agriculture in Africa (Brookes *et al.*, 2013).

Even though agriculture contributes substantially in most African economies, there has been a notable decline in spending on agricultural research, which led to poor infrastructure. This has, in addition to the slow adoption of modern agricultural technologies, negatively affected the growth of agriculture. New technologies, such as the Green Revolution, which had prospered in the sixties of the last century, have not been introduced in some African countries and many have not yet heard about it. Assistance in getting access to technologies and modern production inputs, such as improved seeds, fertilizers and financial services, will contribute in the eradication of food insecurity (Al-Baguri, 2014).

In addition, the sustainable development of agriculture, including livestock, must be appreciated and implemented as a means to poverty reduction and the achievement of food and nutrition security. Appreciating the contribution of the livestock sector to the development and growth of sustainable agriculture for food security and nutrition, will play a role in addressing low food quality and quantity. This will assist in making progress towards meeting the goals in the 2030 Agenda for Sustainable Development, in achieving food security and nutrition with the input of smallholders (Grace, 2016).

The FAO in its initiative to foster agriculture and rural development, suggested that agriculture can contribute significantly to economic growth and creating jobs, hence

their key objectives are to increase agricultural output and productivity, raise rural living standards, improve market access and support agribusiness (FAO, 2017a). One country to note is that of Uganda, as it has one of the fastest growing economies in Africa. Agriculture has a significant contribution towards its economic development and it is enhancing the country's progress toward the second Sustainable Development Goal of ending hunger and all forms of malnutrition, by 2030. While Uganda is still faced with challenges of poverty, hunger and malnutrition, the USAID's agriculture programs address these challenges by reducing food insecurity and providing the means for household income generation (USAID, 2019). This suggests that agriculture must be appreciated and developed to address the current food insecurity challenges in Lesotho.

2.3.9 The Benefits of Oyster Mushroom Production on Food Security

2.3.9.1 *Oyster mushroom production*

Mushrooms are fungi and they have a unique life-cycle and growing conditions. Mushrooms do not sexually reproduce by seed, they are asexual. It does not obtain energy through photosynthesis compared to green plants, it reproduces by means of spores. These spores germinate to produce a mass of interwoven, single-cell wide structures known as hyphae. Collectively, masses of hyphae are referred to as mycelium. Oyster mushrooms are easier to grow than other mushroom species with relatively less complicated techniques and methods (Kaul & Dhar, 2007; Chang & Miles, 2004).

Oyster mushrooms (*Pleurotus* species) have gained popularity in the food market. It is cultivated and used worldwide. Oyster mushrooms are liked for the high nutritional content, good taste and medicinal properties. They have a high protein content, dietary fibre, essential minerals and some vitamins. These mushrooms also have pharmacological uses, such as anti-diabetic, anti-microbial, anti-inflammation, anti-hypercholesterolemia, anti-cancer, anti-hypertensive, hepato-protective, anti-oxidant and anti-allergic activities. The high nutritional value and medicinal properties contribute to Oyster mushrooms' high importance (Adebayo & Oloke, 2017).

Early studies state that there are several reasons why there is an increasing interest in mushroom cultivation. Mushrooms could contribute in providing enough food for a rapidly growing world population. Mushroom cultivation can be used in the recycling of certain agricultural and industrial wastes, which is an advantage to the environment. Also, the used substrate, following the harvesting of the mushrooms, is valuable as a fertiliser and a soil conditioner for the growth of plants, which will improve agriculture (Brenneman & Guttman, 1994).

Mushrooms have been grouped into three categories with respect to their economic importance; these are toxic mushrooms, edible mushrooms, and medicinal mushrooms. Toxic mushrooms produce toxic substances that have harmful effects. Edible mushrooms are used mainly in cooking, as they have a desirable taste and aroma without a poisonous effect. On the other hand, medicinal mushrooms contain extracts that are used to treat diseases. Oyster mushrooms are the edible type (Ganopedia, 2011).

2.3.9.2 Oyster mushroom cultivation

Cultivation of Oyster mushrooms started in Germany in 1917, on tree stumps and wood logs (Upadhyay & Sing, 2010). Oyster mushrooms grow on dead organic matters of vegetative origin and can utilise almost all forest and agricultural residues as substrates (Adejoye *et al.*, 2006). Fogel and Rogers (1997) agree that mushrooms and other fungi grow on almost any natural material. Oyster mushroom cultivation can play an important role in managing organic wastes, whose disposal has become a problem to the environment (Das & Mukherjee, 2007). Oyster mushrooms can be cultivated in many different growing systems from simple and less costly to highly complex and expensive (Barney, 1997).

The methods for cultivating Oyster mushrooms are easy to follow, as it does not require complex scientific techniques. Lay people do not need intense supervision to cultivate the fungi. The cultivation of the fungi is dependent on the availability of specific physical, chemical and biological factors (Rangel *et al.*, 2006). The important processes that jointly provide the three factors needed for cultivation, include substrate selection, soaking, pasteurisation, spawning, fruiting and harvesting. The following are

steps to be followed in the cultivation of Oyster mushroom. This method is among the simplest and inexpensive methods of cultivation (Mensah, 2015; Randive, 2012).

- **Substrate selection**

A substrate is any material that serves as a mechanism that allows an environment where the growth of a living organism can occur, allowing enzymes to be active and release nutrients for the growing organism. Oyster mushroom is grown on various substrates, such as maize straw, wheat straw, rice straw, paddy straw, bean straw, finger millet straw, and vegetable plant residues (Mensah, 2015; Randive, 2012). The production plant that produces Oyster mushroom spawns in Lesotho uses wheat bran, grass powder and maize powder (Ministry of Agriculture and Food Security, 2018).

- **Soaking**

The main purpose of soaking the substrate is to prepare it to create a suitable environment that will promote the growth of mushrooms, yet excluding the growth of other micro-organisms (Obodai *et al.*, 2010) and also to ensure the timely release of the nutrients for the growing organism. The process is also known as composting, and different substrates take different composting periods for the production of Oyster mushrooms. One of the composting methods involves chopping the substrate into 3-5 cm pieces and soaking it in fresh water for 8-16 hours. Excess water from straw is drained off (Mensah, 2015; Randive, 2012).

- **Pasteurisation**

Pasteurisation is the sterilization of substrates at a temperature that deactivates harmful micro-organisms without changing the chemistry of the substrate. It results in minimising contamination problems and gives higher and almost constant yields. Water is boiled in a wide mouth container, such as tub or drum. The wet substrate is filled in porous bags. The filled bag is dipped in hot water of 80-85°C for about 10-15 minutes. To avoid floating, it is pressed down with some heavy material. After pasteurisation, excess hot water is drained off from the container so that it can be reused for other sets. The hot water temperature is maintained at 80-85°C for all sets to achieve a uniform pasteurisation (Mensah, 2015; Randive, 2012).

- **Spawning**

When the pasteurised substrate has cooled down to room temperature, it is ready for filling and spawning. At this stage, the substrate moisture content is about 70%. Polyethylene bags or polypropylene bags are used for its cultivation. One 500 ml bottle spawn (200-250 g) can be used for 10-12 kg wet straw (3 bags). Spawning can be done in layer spawning, where the substrate is compacted in the bag to the depth of 8-10 cm and spread with a handful of spawn on top of it. More layers with the same depth are filled in the bag with the spread spawn between the layers. After filling all the bags, they are closed and sealed for spawn development. The bags are placed in a clean place at 25-35°C temperature and 70-85% humidity. These conditions are maintained by lightly sprinkling water twice a day on the floor and walls. The bags are left for 15-20 days to allow the mycelium to fully cover the substrate (Mensah, 2015; Randive, 2012).

- **Fruiting and harvest**

After 20-22 days, the bags should be fully covered with white mycelium, which are taken into a room where cropping will take place. The polythene bags are removed and the uncovered blocks are kept on racks, about 20 cm apart with gaps of 50-60 cm between two shelves, to allow for fruiting. The temperature in the room must be at 20-33°C for the mushrooms to grow and the humidity is maintained by lightly sprinkling water twice a day on the walls and floor of the room. Pin heads will project from the blocks and this is called fruiting. Once fruiting has occurred, the water is also lightly sprinkled on the blocks. A little heavier sprinkling is done on the blocks when the projections are 2-3 cm big. The pinheads will grow until they are ready for harvest. After the first harvest, the outer layer on the blocks is scrapped to initiate the second flush, which will be seen after 7-10 days. Post-harvest, the mushrooms are packed in perforated polythene bags to keep them fresh. The harvested Oyster mushrooms are delicate and sensitive, and start losing their freshness after 1 day, which can be prevented by keeping them in the refrigerator. Their shelf-life is also limited to a few days in the refrigerator, which possess a challenge to the distribution and marketing of the fresh product. This places a need to find ways to extend the mushroom's shelf-life (Akbarirad *et al.*, 2013). One of the identified ways to preserve Oyster mushroom is shed drying (Mensah, 2015; Randive, 2012). The dried form will provide a solution

to challenges, related to distribution and marketing. This could increase their availability in the market and raise awareness about their commercial and nutritional significance, encouraging the expansion of its production and consumption (Tolera & Abera, 2017).

2.3.9.3 Benefits of Oyster mushroom

Oyster mushrooms are not part of the traditional cuisine of Lesotho, but in 2007 the production of Oyster mushrooms was introduced. The mushroom production project was introduced, because of the potential it has in supporting the socio-economic developments that would contribute in addressing the problem of unemployment and poverty. The main development objectives of this project, through the Ministry of Agriculture and Food Security, are to enhance food security through diversified crop production, to increase farmers' incomes, to create more employment (particularly among the elderly, disabled, women and the youth) and to alleviate poverty. This would enable the achievement of the Government of Lesotho's Vision 2020, Sustainable Development Goals, Poverty Reduction Strategy and even Food Security policy (Ministry of Agriculture and Food Security Report, 2018).

The project aimed to also assist in sustainably improving the QOL and alleviating food insecurity in Lesotho through the supply of mushrooms as a source of protein food. This would reduce malnutrition and protein deficiency among extremely poor people. The project was also expected to protect the environment through JUNCAO grass cultivation in degraded lands, offering soil conservation measures (Ministry of Agriculture and Food Security Report, 2018).

Some of the benefits of Oyster mushroom production are economical, nutritional, medicinal and environmental. In Ghana the prevalence of protein malnutrition was one of the major nutritional problems. Consequently, diseases such as marasmus, kwashiorkor, and anaemia were becoming widespread. The FAO recommended the consumption of mushrooms as a good protein source that could also convert agricultural wastes into high protein food. The protein content in Oyster mushrooms ranges from 21 - 40% (dry weight), which is relatively high. The high protein content of Oyster mushrooms provides a less expensive alternative to meat. Most households consume the Oyster mushroom as stew, which is eaten with rice or porridge.

According to an interview conducted (Nkoko, 2018) related to a study on the influence of the Oyster mushroom project, respondents from the households engaged, stated that they were given demonstrations for different recipes by the Ministry of Agriculture and Food Security and the JUNCAO project. These recipes included, mushroom stew, mushroom with eggs, mushroom added to chicken or legume soup and mushroom sauce, which they enjoyed. They also mentioned that the mushrooms can be cooked with different foods and it makes it easy to try different recipes.

They are also rich in minerals and contain vitamins B1, B2, B6, B12, C, D, which are essential for human health. Mushrooms can be dried and powdered to add to infant food, increasing the nutritional value of the food (Atikpo *et al.*, 2008). Mushrooms have been attracting attention from mankind since ancient times and the use of mushrooms as food, is as old as human civilisation. They add a significant dietary value since they are rich in protein, non-starchy carbohydrates, dietary fibre, minerals, and vitamin-B and have no cholesterol, and a negligible amount of fat. Mushroom proteins are of a high quality and they contain an abundance of essential amino acids (Sadler, 2003).

The use of mushrooms may contribute significantly to overcome protein deficiency in the developing countries where households are unable to afford good quality proteins from animal sources, or when they are either unavailable or unacceptable, because of religious beliefs (Dunkwal *et al.*, 2007). Mushrooms can be a good supplement by adding high nutritional value. Owing to its good nutritional and high digestibility values, mushrooms are gaining importance in today's healthy diet (Tolera & Abera, 2017).

A case study that was done in Tanzania where villagers were involved in the production of Oyster mushroom revealed some of the benefits of Oyster mushroom production. The benefits of growing and selling mushrooms have enabled farmers to buy livestock (chickens and goats), pay for education services, procure household goods, and a number of farmers were able to reinvest to grow their mushroom production. The nutrition of the household is also improved. Most households, even those that own livestock consume low animal protein. Their protein intake is increased by the consumption of Oyster mushrooms (Marshall & Nair, 2009).

Mushroom growing also accommodates all members of the community, including the youth, elderly and the disabled. The youth help the older and disabled. In this way,

there is a means for income generation for all groups, including the vulnerable community members (Marshall & Nair, 2009).

Mushroom cultivation can therefore contribute to poverty reduction and QOL, by providing the means for income generation from a nutritious source of food and a reliable source of income. Since it does not require access to land, mushroom cultivation is a viable and attractive activity for both rural farmers and peri-urban dwellers. Small-scale growing does not include any significant capital investment: mushroom substrates can be prepared from many clean agricultural waste sources (Marshall & Nair, 2009).

Apart from reducing protein deficiency in developing countries, mushroom cultivation is also a means of income generation, especially in poor rural households. This is one of the projects that contributes in achieving the objectives of rural development in developing countries, which aim to diversify rural income and improve the agricultural sector to create jobs and economic growth (Sharma *et al.*, 2013). The households that are engaged in the Oyster mushroom project in Lesotho reported that they sell their produce to their neighbours and colleagues mostly, and a few of them are able to supply hotels, guesthouses, restaurants and supermarkets. While some farmers stated that the Basotho nation needs to be extensively educated about the Oyster mushroom to improve their sales, others have no challenges at all in marketing and selling the produce. Oyster mushroom as a health promoter and environmental restorer, is gaining more importance as compared to medicinal mushrooms, resulting in an increase in their research and development activities during the past two decades (Patel *et al.*, 2012).

In a particular supplementation study that sought to determine the health benefits of Oyster mushrooms, a sample of human volunteers with hyperglycaemia, hypertension and hypercholesterolemia was used. The dried mushrooms in a powder form were added to their diets and each subject took 5g per day for three months. The blood profile of the participants was monitored at periodical intervals to assess the effect of the mushroom supplement. After three months, a significant decrease in the blood cholesterol levels and blood glucose was observed, with the use of the results from the blood profiles. The effect of the supplementation was not noticeable in the first few

recordings, but a slight decrease was evident towards the end of the 3 months (Jaziya, 2011).

However, Oluwalana *et al.* (2016) argues that despite the numerous nutritional health benefits and medicinal values of the mushrooms, the importance of mushrooms in food security, especially in developing nations, is not appreciated. In addition, the economic importance of mushrooms is often overlooked. The contribution of Oyster mushroom production to household nutrition, economy and food security, medicinal values, employment opportunities and environmental conservation is inevitable. Developing countries that are battling with poverty would do well to begin to promote the cultivation of mushrooms, which can help alleviate poverty, reduce disease incidences, and help promote skill acquisition by the local people.

2.4 SUMMARY OF THE LITERATURE REVIEW

QOL and food security are interlinked in contributing to the wellbeing of the global community. When any group of people are food insecure, their QOL is adversely affected. Food insecurity continues to be a global challenge that affects health and development, and Lesotho is not an exception to this phenomenon. Agriculture is one of the ways that have improved food security and has contributed to the economic development of countries such as Uganda.

However, climate change is persistently affecting agricultural production and Lesotho is vulnerable to the impact of climate change, with high exposure to climate variability and extremes. This has contributed to the high poverty rate in the country. The Oyster mushroom project was introduced in Lesotho to enhance QOL and food security. The project aims to contribute towards achieving the second Sustainable Development Goal of ending hunger and all forms of malnutrition, by 2030. This would be done through the consumption of mushrooms (high protein content food) and income generation from selling the mushrooms. This project has enhanced food security in countries such as Tanzania and Ghana.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 METHODOLOGY

This study focused on the food security and quality of life (QOL) of the households involved in the Oyster mushroom production project in Maseru, Lesotho. This chapter delineates the processes and methods used in collecting and analysing data.

3.2 RESEARCH DESIGN

This is an exploratory study conducted in the Maseru district of Lesotho, and is quantitative in nature. According to Du Plooy-Cilliers *et al.* (2014), quantitative research is concerned with quantities and measurements. Tichapondwa (2013) agrees that it deals with numbers and statistics, focusing on controlling components, actions and presentations of participants – the phenomenon studied, and these are called variables. This method describes variables, examines relationships among variables and determines the cause and effect of interactions between variables. The variables in this study are income, health, water access, toilet access, food access and food availability. These variables were used to describe food security and QOL in this study.

3.3 POPULATION OF THE STUDY

The study included the entire population of households engaged in the mushroom production project in Maseru, as the number of households involved in the project was limited. There were 50 households that were engaged in the Oyster mushroom project. Among them, 10 were used as the pilot group and 33 took part in the study. Although the aim was to make use of all the respondents, 7 of them could not be reached.

3.4 MEASURING INSTRUMENT

This study used a developed questionnaire as a measuring instrument, which contained open-ended and close-ended questions. The questionnaire was administered with the assistance of a field worker. The participation of the respondents was entirely voluntary and no incentives were given to the participants after completing the questionnaire.

The questionnaire was originally developed in English and translated to Sesotho. The translation was done to ensure that the questionnaire was clear and understandable for the participants. The questionnaire consisted of the following sections:

3.4.1 Quality of life

Household income, access to health services, access to water and sanitation were chosen as indicators of quality of life in this study as they can be used to also determine household food security (Radimer *et al.* 1990).

3.4.1.1 Income

The questions in this section informed the objective that aimed to assess the income of the households involved in the Oyster mushroom project. The questions aimed to find the levels of income of each household, the sources and the stability of their income.

3.4.1.2 Health

This section had questions that assessed the access to health services of the respondents, which is related to the objective that sought to describe the QOL (in relation to health) of the households engaged in the Oyster mushroom project. The health of the respondents was assessed by the access to health facilities and use of health related items.

3.4.1.3 Water and Sanitation

The questions in this section sought to find the experience of the respondents on access to water and sanitation, which will enable the description of the QOL (in relation to water and sanitation) of the households engaged in the Oyster mushroom project. The questions included the facilities that the households use for sanitation. The sources of water and the distance from the source were also used as indicators for access to water and sanitation.

3.4.2 Food Security

This section made use of the perceptions of the respondents to assess the quality and quantity of food available to them. Feelings of uncertainty or anxiety over food, together with reductions in food intake are assessed to provide insight into the ways that families experience food insecurity. The households' experiences and feelings of uncertainty over food and money access, experiences of lack of money or food, such that there was not enough food to eat for a specific month over the past 12 months, coping strategies and the number of meals eaten by the household the previous day, were used as indicators for household food security. Food groups consumed by the household the previous day and 7 days prior to the study, together with the sources of food and monthly expenditure on food groups, were also used to further assess food security in relation to access to nutritionally adequate food (Labadarios *et al.* 2009; Radimer *et al.* 1990).

3.5 VALIDITY AND RELIABILITY

3.5.1 Validity

The questionnaire was examined by a number of experts to ensure the internal validity of the measuring instrument. Their views and suggestions were incorporated into the instrument.

3.5.2 Reliability

Reliability refers to the repeatability, replicability and consistency of the instrument, that is, the extent to which it can be reproduced (Tichapondwa, 2013). The questionnaire that was used in this study was pre-tested to ensure reliability. A total of 10 participants who were involved in the mushroom production project in Maseru were used to pre-test the instrument. The Cronbach's Alpha formula was used to determine the coefficient of reliability. It is a reliability test technique that requires only a single test administration to provide a unique estimate of the reliability for a given test (Gliem & Gliem, 2003). In this particular study, the reliability coefficient obtained was 0.88 and was considered suitable.

3.6 DATA COLLECTION

Prior to the survey, ethical clearance was obtained from the University of the Free State Research Ethics Committee (Appendix A). The respondents were given consent letters that were in their native Sesotho language before participating. The survey was conducted at the household level and a structured questionnaire was used to collect data. In view of this, it could be argued that the advantage of a structured questionnaire is to allow respondents to answer questions as quickly as possible and that respondents answer exactly the same questions, making the research method reliable. The questionnaire sessions lasted between 30 and 45 minutes per household. The questionnaires were administered with assistance of a fieldworker to avoid the problem of misinterpretations or misunderstandings of words or questions.

Data was collected during August 2018 at the respondents' homes and workplaces. The questionnaire was administered with the help of the field worker. A list of the individuals involved in the Oyster mushroom production project, who live in Maseru and their contacts was provided by the Ministry of Agriculture and Food Security. The respondents were called to make appointments. While most of the respondents were available, some were not available on their phones and others clearly stated that they are too busy to participate. As a result only 33 (from the possible 40) respondents were available for data collection.

3.1 DATA ANALYSIS

Statistical Package for social sciences (SPSS) version 25.0 was used to analyse data. Descriptive statistics were used to organise and summarize data to enable interpretation. The descriptive statistics involved frequencies, binomial and Chi-square tests, to support the interpretation of the results. The Chi-square test is a general test designed to evaluate whether the differences between observed frequencies and expected frequencies, under a set of theoretical assumptions, is statistically significant (Frankfort-Nachmias & Nachmias, 2002). The binomial test uses the binomial distribution to determine if the outcome of an experiment, in which we count the number of times one of two alternatives has occurred, is statistically significant (Abdi, 2007). Statistical significance has been tested at 5%, that is, p-values at 5% and below are statistically significant and those above 5% are statistically insignificant.

CHAPTER 4: FINDINGS AND DISCUSSION OF THE STUDY

4.1 INTRODUCTION

This chapter addresses the findings of the study in relation to the objectives. The general objective of the study was to describe the food security and quality of life (QOL) of the households, engaged in the Oyster mushroom production in Maseru.

QOL is the extent to which human needs are fulfilled, in relation to personal or group perceptions of subjective well-being. Human needs include physiological needs, the need for safety, love, esteem and self-actualisation. Among the satisfiers for subsistence needs are food and shelter (Constanza *et al.*, 2007). The need for food to satisfy human well-being establishes a relationship between QOL and food security. It is further confirmed through the definition of food security, which states “all people, at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2008). Consequently, it can be assumed that the attempt to decrease food insecurity will also affect QOL.

This study measures food security and QOL, considering a number of indicators namely: food, income, energy, health access, toilet access, water and sanitation. The findings from the households involved in Oyster mushroom production (HOMP), that are related to QOL and food security, will be presented. The interpretation of the findings is supported by frequencies, chi square and binomial tests. The findings address the following objectives:

1. To describe the QOL of the households engaged in the Oyster mushroom project.
2. To describe the household food security of the households involved in the Oyster mushroom project.

4.2 DEMOGRAPHIC AND HOUSEHOLD INFORMATION

4.2.1 Demographic information

A summary of the basic demographic information of the households involved in the Oyster mushroom production in Maseru, is presented in table 4.1. The respondents were the household members participating in the Oyster mushroom project and they were all above 21 years of age, with the majority (72.8%) over the age of 40 and 60.6% married. One third were male and two thirds female. Most of the respondents in this sample were thus middle aged, married women. Many of the male citizens of Lesotho work in South Africa, resulting in a greater number of women in the country responsible for the households' daily needs (UNESCO, 2012).

Table 4. 1: Demographic information (HOMP n=33)

Age of the respondents		
	%	n
16 - 20	0.0%	0
21 - 25	3.0%	1
26 - 30	12.1%	4
31 - 35	3.0%	1
36 - 40	9.1%	3
41 - 50	15.2%	5
51 - 60	27.3%	9
61 or older	30.3%	10
Gender of the respondents		
Male	33.3%	11
Female	66.7%	22
Marital Status		
Married	60.6%	20
Widowed	3.0%	1
Separated/divorced	3.0%	1
Never married/ single	33.3%	11
Living with partner	0.0%	0

4.2.2 Household Information

Factors such as household size, the period lived in an area and items owned by a household contributes to the experiences of households related to food security and QOL. Household size is related to food security in that an increase in the household size tends to put a greater burden on salary earning of members and may affect their food security status, due to availability of limited resources (Ahmed *et al.*, 2017). Moreover, the period lived in an area by the household, informs the extent to which a community is settled, as long periods of residence are often proof of stability (Swanepoel, 2017).

Table 4. 2: Household size and period lived in the same area (n=33)

Number of people currently living in the household		
	%	n
1	6.1%	2
2-4	57.6%	19
5-6	27.3%	9
7 or more	9.1%	3
Number of years lived in current area		
Less than 5 years	21.2%	7
More than 5 years, but less than 10 years	3.0%	1
More than 10 years, but less than 20 years	18.2%	6
More than 20 years	57.6%	19

The findings in table 4.2 indicate that more than half of HOMP (57.6%) have 2–4 people living in the household. The household size is similar to the findings that reported that households in Lesotho have an average of 3.3 members (Ministry of Health Lesotho & ICF International, 2016). Among the determinants of food insecurity is the household size (Ahmed *et al.*, 2017), of which the findings of the present study implies that their food insecurity status may not be a result of household size, as the household size is not large. In addition, 57.6% of the HOMP have lived in the same area for more than 20 years, which is indicative of a settled and stable community.

Furthermore, items owned by the household, such as a vehicle, enable income generation and food access (Table 4.3). Owning a vehicle has benefits to the household that are correlated with the ability to procure sufficient quantities of food. A

vehicle also enables access to markets that are far and can also be used to transport a harvest to the market for income generation (Fitzpatrick & Ver Ploeg, 2010). Mobile phones enable communication and access to disseminated information. Mobile phones make it possible to access information without travelling to the source of information, making information accessible through faster and effective means (Mwangi, 2012). An item such as a watch, is more symbolic of what it represents (i.e. literacy to read time) than the item itself (Idang, 2015). Consequently, being in possession of such items by households, exposes them to better QOL and food security.

Table 4. 3: Items owned by the household (n=33)

Item	Yes	n
Watch	100.0%	33
Mobile phone	97.0%	32
Car or Truck	39.4%	13
Bicycle	30.3%	10
Motor cycle/motor scooter	9.1%	3
Animal drawn cart	0.0%	0
Boat with a motor	0.0%	0

All of the respondents own a watch, 97% own a mobile phone and 39.4% own a vehicle, which indicate that they have access to help in case of emergency.

It is evident from the data presented in table 4.4 that shops where basic food can be bought, are accessed within 30 minutes by most households (84.8%). The market to buy food, markets where food can be bought and sold, banks and a post office are more than 30 minutes away for most households. According to Prinsloo (2010), in the urban areas a food store must be accessed within 2km for local convenience. Even in big cities with many outlets, it takes a few minutes to reach a shop for the most basic food and household items. A market where fresh produce or own harvest can be sold, in less than 30 minutes' travel, is only accessible to 15.2% of the respondents. A similar study in the neighbouring country of South Africa, in the informal settlement areas of Cape Town, indicated that a shop will be reached within 9 minutes. In Khayelitsha (an informal settlement in the same city), it will take most people 34.3 minutes to reach a similar facility (Swanepoel, 2017). It takes more than 30 minutes

for most of the HOMP to reach the bank (87.1%) and post office (90.9%). In Cape Town, banks and post offices are on average less than 30 minutes away, whilst in Khayelitsha it takes more time to reach the same facilities (Swanepoel, 2017). Cape Town is a big city, while Khayelitsha is an informal settlement in the same city, suggesting that services are nearer in developed cities. Yet in Maseru, the capital city of Lesotho, access to services is poorer with similarities to an informal settlement (Khayelitsha).

Table 4. 4: Access to facilities within 30minutes (2km) (n=33)

Facilities	Yes	n
Shop where basic food can be bought	84.8%	28
Market to buy foods	15.2%	5
Markets where you can sell goods and food	9.1%	3
Bank	12.1%	4
Post office	9.1%	3

Considering the findings that indicated 60.6% (Table 4.3) of the respondents do not own a car, the long distances to be travelled to get some services such as markets, banks and post offices, may imply the use of public transport. Half of the respondents have an income range of between M1 – M3000, which is considered a low income. Consequently, from this low income they also pay a commuters fee of M7.50 for the mini-buses and M8.00 for a taxi cab, per 10km radius for public transport to access these services (Mokhele, 2018). This places additional pressure on food security as more money needs to be spent on transport, reducing the amount that could be spent on food.

It seems that there are services that are far from the HOMP in Maseru, possibly an indicator of poor QOL. According to Booth, Hanmer and Lovell (2000), poor people's lack of access to services, assets and technology means that production for the market and for the household is time and energy consuming. Improving services and access to services can contribute to poverty reduction strategies that aims to reduce time spent in low productivity (Booth *et al.*, 2000).

It is added that food access is determined by physical, financial and social resources. Access to services and markets contributes to the QOL and food security of poor rural

households. Without good access to markets, a household with less resources cannot market its produce and generate income. Equally important, it cannot utilise its limited resources, such as land efficiently. Access to markets is essential and is a prospective means to alleviate poverty. While there are many ways that markets contribute in improving the wellbeing of the households, it is crucial to have relevant assets required, to make effective use of these markets, especially public transport (Taylor *et al.*, 2008).

4.3 DESCRIPTION OF THE QOL BY MEANS OF LIVING CONDITIONS OF THE HOUSEHOLDS ENGAGED ON THE OYSTER MUSHROOM PROJECT

This objective will be addressed with the use of three indicator: health, water and toilet access.

4.3.1 Health

This section consists of questions that assess the health of the respondents, which is related to the objective that sought to describe the QOL (in relation to health) and food security of the households involved in the Oyster mushroom project. The multidimensional nature of QOL describes it as the consideration of satisfaction with life across segments of daily living, including health. Satisfaction itself has several aspects, including desire for change and satisfaction with past, present and future aspiration fulfilment (Diener *et al.*, 1999).

Health is also an indicator of food security under the utilisation pillar. Utilisation involves the use of food to its fullness and the implication it has on a person's ability to absorb and use the nutrients from the food. This is related to the individual's health status and access to health services (Gibson, 2016). Poor access to health services is one of the factors that contribute to the shocking levels of malnutrition and food insecurity in Africa (Fanzo, 2012).

In addition, poor health can lead to low productivity and the inability to generate income for the household. This in turn increases the possibility for food insecurity, since expenditures on healthcare services must be met by the low income, this implies that

there is less money for food, resulting in purchases of cheaper food rather than healthy foods (Berkowitz *et al.*, 2014).

Table 4. 5: Health Indicators (n=33)

Health indicators	Yes	n	p - value
Visitation to the hospital to stay overnight	12.1%	4	0.05*
Visits to health care centres without staying over night	72.7%	24	0.01*
Health Insurance	0.0%	0	0.00*
Money spent on health related items	78.8%	26	0.01*

*Significant at the 5% level

Table 4.5 shows that 12.1% of the HOMP were admitted in hospital to stay overnight, indicative of the availability of appropriate facilities (i.e. hospital), when required. Since the reasons for admission have not been stated, the health status of the respondents cannot be concluded. One could have been hospitalised for childbirth for example, which does not suggest anything about the health status of an individual. The responses of the respondents on the visitation to hospital to stay overnight are statistically significant ($p=0.05$). While the health benefits of Oyster mushrooms would be suggested as reasons for the low admissions to hospital, the findings of this study do not allow the researcher to make such claims, it merely indicates that hospitals are available when required. However, Valverde *et al.* (2015) do indicate that a large variety of mushrooms have been traditionally utilised by different cultures for health purposes, prevention and treatment of diseases. Oyster mushrooms are suitable for people with obesity, high blood pressure and diabetes, as they contain low starch, sodium/ potassium ratio, fat and calorific value (Thakur, 2014).

Jaziya (2011) conducted a supplementation study that sought to determine the health benefits of Oyster mushrooms, where a sample of human volunteers with hyperglycaemia, hypertension and hypercholesterolemia was used. The dried mushrooms in a powder form were added to their diets and each subject took 5g per day for three months. The blood profiles of the participants were monitored at periodical intervals to assess the effect of the mushroom supplement. After three months, a significant decrease in the blood cholesterol levels and blood glucose were

observed in these results based on the blood profiles. The effect of the supplementation was not noticeable in the first few recordings, but a slight decrease was evident towards the end of the 3 months (Jaziya, 2011). This study could not confirm these findings as 24.2% of the study group required medicine for high blood pressure. Taking into consideration the average age of the respondents (51 to 60), and supported by the findings by Bosu *et al.* (2019) who reported that high blood pressure is more prevalent among the elderly people in Africa, which might explain the findings of the present study.

Table 4. 6: Reasons for buying health related items (n=33)

Reason	Frequency	
	%	n
Arthritis	36.4%	12
Influenza	9.1%	3
Pain	9.1%	3
High blood pressure	24.2%	8

It is also evident that 72.7% of HOMP have received care from health services without staying overnight. Although a high percentage sought medical help, the mere fact that they have access to medical help when required, is evidence of better QOL. These findings are complimented by the findings from a previous study that indicated that 78.8% of Basotho spent money on health related items (Government of Lesotho, 2013). The responses of the respondents on receiving health care from health services are statistically significant (p-value=0.01). The present study attests to previous findings, indicating that Lesotho is one of the developing countries faced with an increasing double burden of disease. There is a high prevalence of non-communicable and communicable diseases, resulting in high percentages of visitations to the hospital and health expenses (Government of Lesotho, 2013).

The findings also indicate that none of the HOMP have health insurances implying that that they rely on the health care centres made available by the government. Many sub-Saharan African countries, Lesotho included, are not part of any medical insurance scheme. This is especially true for low income households. The Ministry of Health & ICF International (2016) states that 98.0% of both women and men, aged 15-49 in Lesotho, do not have health insurance. Table 4.10 confirms that 51.2% of the HOMP

have an income that ranges from M1 – M3000.00. This level of income may not allow for health insurance payments. These facts emphasize the importance of healthy lifestyles to combat disease.

It is evident from respondents of this study (table 4.6) that households involved in the Oyster mushroom production, spent money mostly on health items for Arthritis. Based on the average age of individuals involved in the Oyster mushroom project, indicated expenditure on arthritis and blood pressure medication is appropriate as supported by other research (Mugomeri *et al.*, 2015; Bosu *et al.*, 2019). The 9.1% of the respondents that spent money on items for flu might be a result of the winter season, since the data was collected in August 2018.

4.3.2 Water and Sanitation

Water and Sanitation are one of the key indicators of food security under the utilisation pillar. It is related to hygiene, good health and optimal biological utilisation of food. Furthermore, access to sufficient and safe water for drinking and sanitation improves quality of life (QOL). Good clean water helps in reducing vector-borne diseases and is necessary for food preparation. It also supports digestion, transportation and absorption of food. It is critical to the hygiene of an individual and society, as hygiene is essential to keep up good health (Gibson, 2016).

The Millennium Development Goal that addressed water access, had a program that defined safely-managed water as having access to an improved source, which has the potential to deliver safe water by nature of their design and construction and include piped supplies (such as households with tap water in their dwelling, yard or plot; or public stand posts) and non-piped supplies (such as boreholes, protected wells and springs, rainwater and packaged or delivered water) (WHO & UNICEF, 2017).

The questions in this section sought to find the experience of the respondents relating to water and sanitation. This will enable assessment of the QOL (in relation to water and sanitation), as well as one dimension of food security (utilisation) of the households involved in the Oyster mushroom project. The questions included the facilities that the households used for sanitation, the sources of water and the consistency in water access.

4.3.2.1 Water Access

The findings indicate that 97% (Table 4.7) of the HOMP have their water sources in their yards. Most, although not all, urban households (70%) in Lesotho have piped water in their own dwelling or yard (Ministry of Health & ICF International, 2016). Furthermore, the responses of the respondents in relation to the location of the water source are significant.

As a result of having a water source in their own yard, the findings also show that 84.8% of HOMP take an average time of 1 to 5 minutes to get to the water source and back. It takes them less than 5 minutes to get to the water source, which is adherent to the recommendations by the World Health Organization (WHO, 2011). The findings indicate a significant level of food security and QOL in relation to the distance to get to the water source (p -value=0.035).

As seen from table 4.7, 60.6% of the HOMP have ways of making water safe to drink, which is contrary to a report stating that most households in Lesotho (87%) do not treat their water prior to drinking, and only 21.0% of the households in the urban areas boil their water (Ministry of Health & ICF International, 2016). Moreover it is reported that 1 in 10 households boil their water, making it the most commonly used method of making water safe. In contradiction, in the present study, 54.3% of HOMP boil their water to make it safe.

Table 4. 7: Water source (n=33)

Location of water source		
	%	n
In own dwelling	3.0%	1
In own yard/plot	97.0%	32
Elsewhere	0.0%	0
p – value	0.05*	
Length of time taken to go to the source of water on foot		
1-5 minutes	84.8%	28
6-10 minutes	15.1%	5
11-15minutes	0.0%	0
p – value	0.035*	
The safety of water as perceived by respondent		
Yes	60.6%	20
No	39.4%	13
p – value	0.296	
Ways to make water safe to drink		
Boiling	54.3%	18
Filtration	6.3%	3
None	39.4%	12
p –value	0.05*	

*Significant at the 5% level.

The results show that 60.6% consider their water to be safe. This indicates a level of uncertainty between members of the community on the safety of the water. The p-value of 0.296 further reiterates the possibility of uncertainty amongst the community. The Water and Sewerage Authority (WASA), now known as the Water and Sewerage Company (WASCO), serves over 300 000 people (residential and industrial customers) in the urban areas. It provides safe drinking water to approximately 50 000 post-paid connections, plus approximately 400 public standpipes. The water is mainly sourced from the Caledon (Mohokare) river, which is supplemented by water from the Maqalika dam when river levels are low and where there is high turbidity in the river (WASA, 2010). In some areas in Maseru, where water is not supplied by WASCO, the households rely on visual assessment of their water to determine its cleanliness. More

than half (52%) of all respondents did not boil their water, despite doubting the cleanliness of their water source. Although people must ensure safety of drinking water before consumption they use the water without taking any safety measures (Workman, 2019).

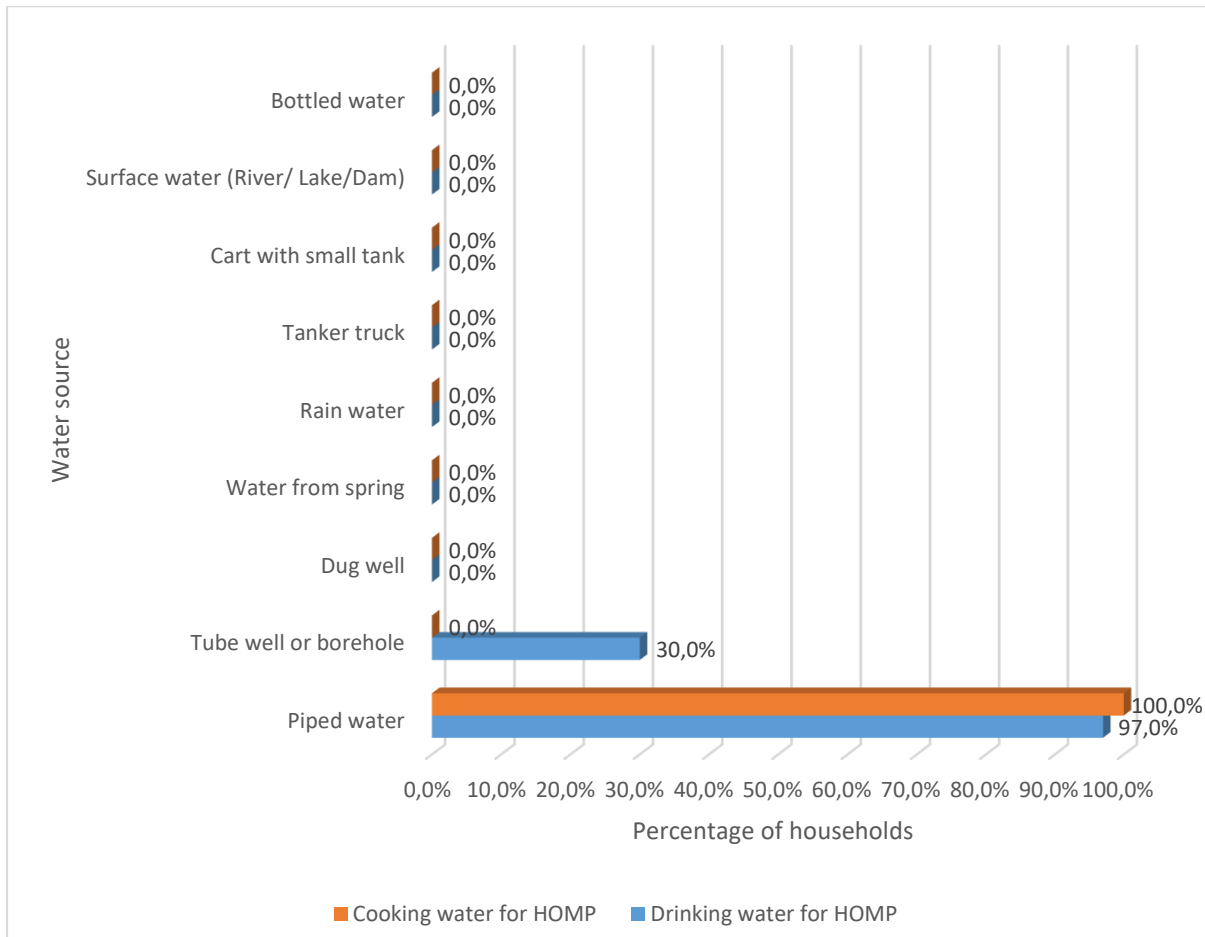


Figure 4. 1: Main source of drinking water for members of the household

The majority of the HOMP households have piped water as their main source of water for drinking (97%) and cooking (100%) (Figure 4.1). The responses are statistically significant (0.05), and not unexpected, as the Ministry of Health & ICF International (2016) indicated that almost all urban households (97%) have access to an improved source of drinking water. Improved sources of water protect against outside contamination so that water is more likely to be safe to drink (WHO & UNICEF, 2017). The households also use piped water for cooking and washing. It should be noted that the Oyster mushroom project participants were approved for the project and the fact that water is required to keep the unit cool and wet, would make it feasible to select

candidates who can easily use clean and safe water for the production of the mushrooms.

4.3.2.2 Sanitation

Improved sanitation is not only an indicator of QOL, but it is also an indicator of food security under the utilisation pillar. Poor sanitation results in diseases, such as cholera and typhoid. These diseases are a result of poor hygiene and contact with faecal matter. The prevalence of these diseases can affect the productivity of the household individuals and this will result in absence from schools and workplaces, which affects the productivity, income generation and development of the households (Gibson, 2016).

According to UNICEF (2009a), the water, sanitation and hygiene (WASH) are affected in times of drought. The WASH situation especially deteriorated in 2007 in Lesotho, when low water volumes were experienced, with 30% of boreholes and springs in populated rural areas not having water. In addition, 60% of the health care centres were affected as they were experiencing lack of access to safe water. Reports from the health data revealed that 85% of clinics' outpatient consultations in all age groups, were due to diarrhoeal diseases. The humanitarian situation challenged the general wellness of female adults and children and was expected to further worsen the prevailing insecure conditions in Lesotho for the next few years. However, in 2018, diarrhoeal diseases accounted for 4% of the visitations to healthcare centres and were amongst the top ten diseases seen in the clinics' outpatient departments, which is a remarkable improvement (WHO, 2018a).

As is evident from figure 4.2, that 42.4% of the HOMP uses piped systems that are connected to a sewer system, whereas more than half (57.6%) uses a pit latrine. The findings of the current study show that these households mostly use improved facilities, which is a good indicator of food security and QOL. Even as far back as 1998, it was found that pit latrines were considered adequate basic sanitation facilities (Sowman & Urquhart, 1998). Improved sanitation facilities prevent people from coming into contact with human waste and consequently reduce the transmission of cholera, typhoid, and other diseases (FAO *et al.*, 2018). The findings also indicate that HOMP have access to safe water and sanitation, as expected, (Ministry of Health & ICF

International, 2016). The supplementary income (Table 4.19) for the HOMP might have enabled the households to improve their living conditions, including toilet facilities.

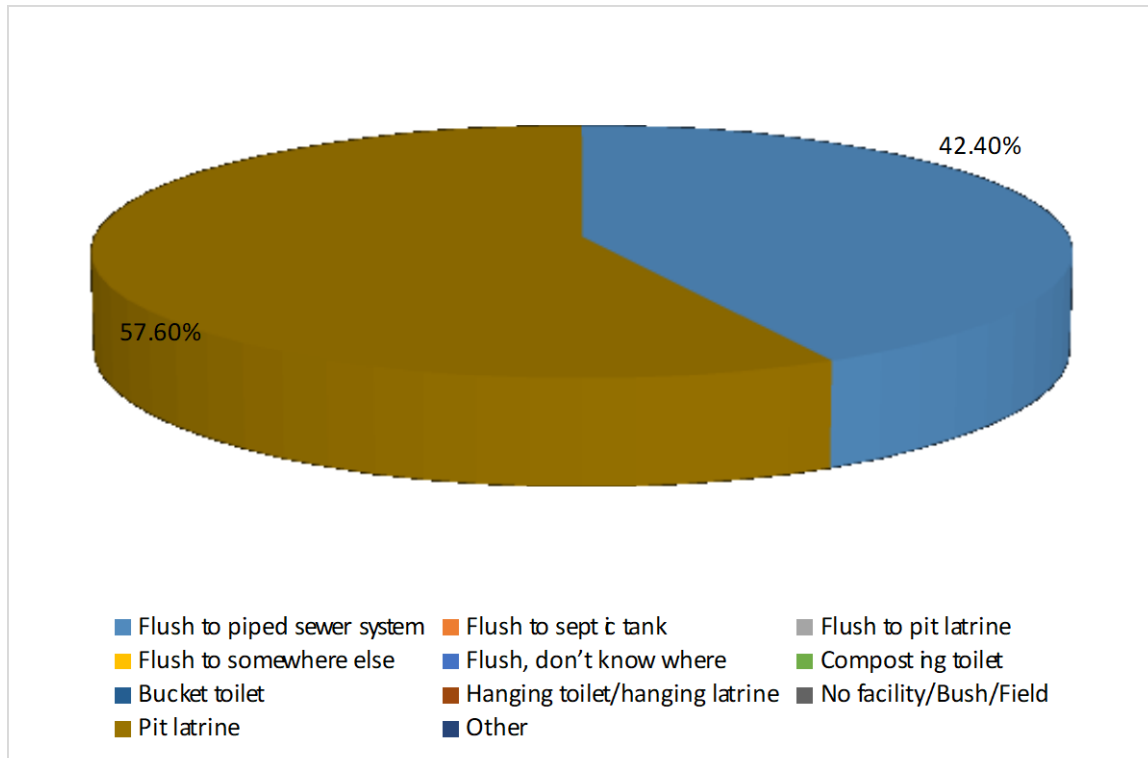


Figure 4. 2: Type of toilet

15.2% of the HOMP share their toilet facility with other households. These findings showed an improvement to the findings of the Ministry of Health & ICF International (2016) that reported 53.0% of households in urban areas share their toilet facility with other households. The findings suggest that the situation in Lesotho has improved since 2014 and the participants in the project experience a better QOL as. Thus a significant improvement ($p = 0.05$) for respondents in this study. The majority of the respondents indicating that they have access to safe and hygienic toilet facilities. It is further indicated that of the households that share their toilet facilities, they share with 6 -10 households.

Table 4. 8: Toilet facilities (n=33)

Sharing a toilet with other households		
	%	n
Yes	15.2%	5
No	84.8%	28
p – value	0.05*	
Number of households who use the toilet facility		
1 – 5	0.0%	0
6 – 10	15.2%	5
Not sharing	84.8%	28
p – value	0.062	
Location of the toilet facility		
In the yard	57.6%	19
In own dwelling	42.4%	14
p – value	1.00	

*Significant at the 5% level.

4.3.3.3 Food preparation and kitchen facility

It is evident that most households (54.2%) of the HOMP use liquefied petroleum gas (LPG) for cooking (Figure 4.3). The findings also show that 21.1% of the HOMP uses electricity. These findings are similar to findings indicating that urban households in Lesotho used LPG (53%) and paraffin (31%) for cooking. Although the data from the Bureau of Statistics does not present it, electricity is also used for cooking by households connected to the grid, although the percentage is expected to be small (UNDP, 2012).

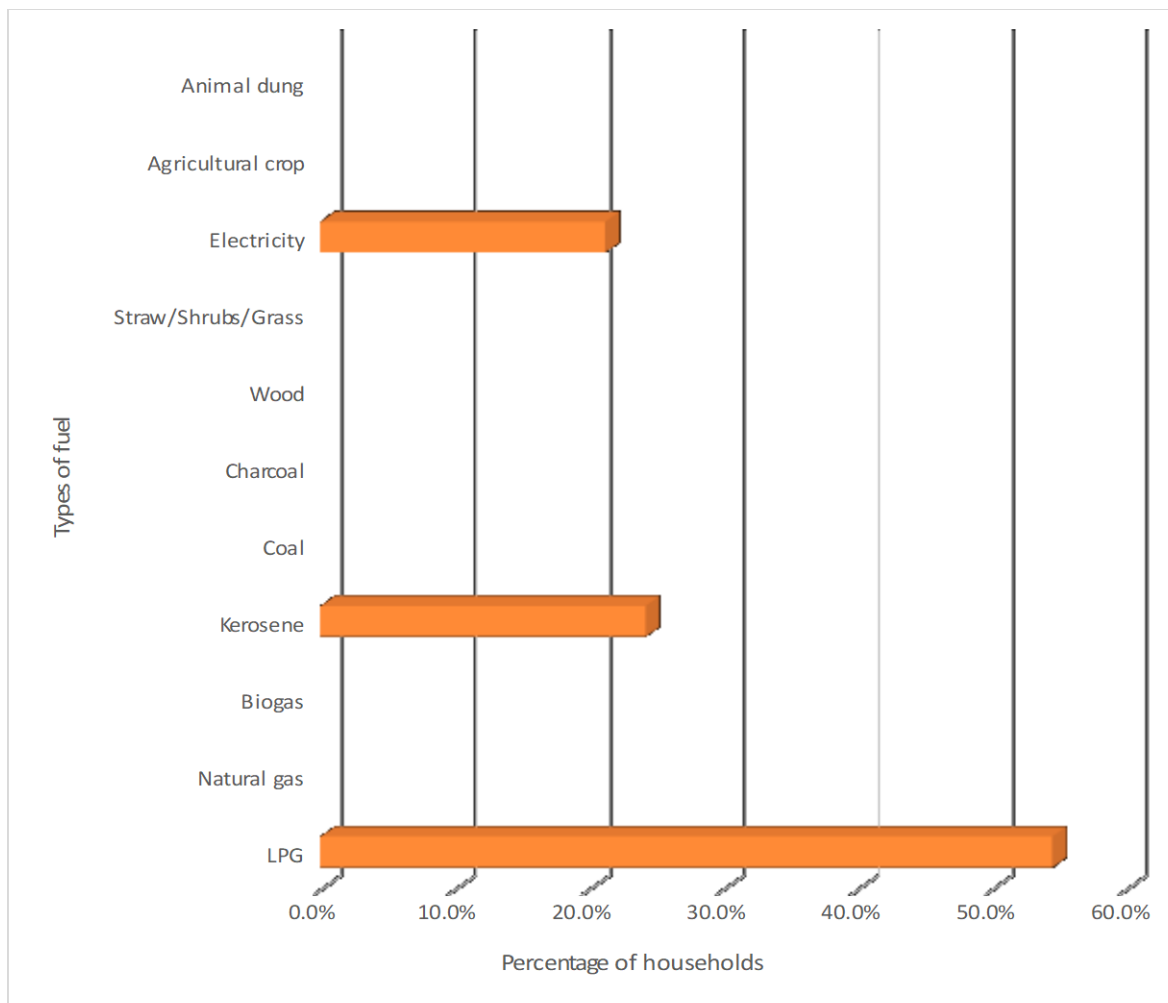


Figure 4. 3: Energy for cooking

The households involved in mushroom production seem to not use biomass for cooking and this is an indicator of good QOL and food security. The excessive utilisation of biomass for fuel has negative effects on the environment, health, agricultural productivity and life experiences of the people. The pollution from burning this matter is a threat to public health and the environment. The environmental effect include deforestation and forest degradation, and significant contribution to another challenge that is global climate change. Female adults and girls spend some of their time collecting biomass and this may affect their ability to carry out income generating activities. Agricultural and general productivity are affected by fuel scarcity, since time is needed to gather biomass, which could be otherwise used on income generating activities (Cordes, 2012; Kissinger *et al.*, 2012; Lim *et al.*, 2012; Shindell *et al.*, 2012). These results thus indicate that the respondents in the project relied on more

convenient and less threatening forms of energy for cooking namely: LPG, electricity and kerosene.

Table 4. 9: Cooking facility (n=33)

Cooking facility		
	%	n
In the house	100.0	33
No food cooked in the household	0.0%	0
In a separate building	0.0%	0
Outdoors	0.0%	0
Kitchen facility	Yes	
Separate room which is used as a kitchen	97.0%	32

The findings from table 4.9 indicate that all the HOMP cook their food in the house, of which 97% have a separate kitchen to do so and only 3% don't. This implies good QOL and food security. According to Soliah *et al.* (2012), unavailability of a kitchen facility, equipment and cooking utensils, as well as inadequate kitchen space, can be limitations to an individual's ability to prepare a healthy meal. Moreover, it is also suggested that owning equipment for household food preparation is important for preparation of meals in the home, and can contribute to healthy eating, since it was found that children in these homes consumed less sugar sweetened beverages, consumed more fruits and vegetables and ate fewer fast foods (Appelhans *et al.*, 2014).

4.3.3 Household income

The questions in this section informed the objective that aimed to determine the impact of the Oyster mushroom production on income generation. The questions aimed to find the levels of income of each household, as well as the sources and the stability of their income. Income is one of the important factors that contribute to food insecurity. Income is closely related to food security in that it affects the financial accessibility of consuming a variety of the different healthy food groups (Roberts, 1998; Savige *et al.*, 2007). Income is also regarded as one of the most significant determinants of food

insecurity and hunger. People who face unemployment, or have a low income and experience financial hardship due to a combination of environmental and structural barriers, are normally food insecure (Lê *et al.*, 2015).

Table 4. 10: Percentage frequency of different levels of household income distribution among HOMP (n=33)

Income per month	Frequency	
	%	n
M1 – M3000	51.2%	17
M3001- M6000	12.1%	4
M6001- M9000	6.1%.	2
M9001 - M12000	9.1%	3
M12001 - M15000	0.0%	0
M15001 - M18000	6.1%	2
M18001 and more	15.2%	5

Table 4.10 indicates that the income of 69.4% of the households involved in Oyster mushroom production ranges from M1 to M9000 per month, with more than half (51.2%) having a very low income that ranges from M1 to M3000. It is evident that only 21.3% of HOMP earn more than M15000. This may be a result of supplementary income associated with the Oyster Mushroom Project. Some findings indicate that the mean household income is M700 per month (Crush, 2016).

Table 4. 11: Income (n=33)

Income indicators	Frequency	
The sources of income of the households	%	n
Employment	57.6%	19
Self-Employment	33.3%	11
Mushroom production	3.0%	1
Pension	6.1%	2
Stability of the source of income		
Temporary/ casual	12.1%	4
Seasonal	45.5%	15
Stable	39.4%	13
Remittances	3.0%	1
Changes in the income of the household in the past 12 months		
Yes	69.7%	23
No	30.3%	10
Reasons for the change in income		
Retrenchment	6.1%	2
Retirement	9.1%	3
Death	12.1%	4
Could not work because of ill health	21.1%	7
Oyster mushroom production plant closed	21.1%	7
No change	30.3%	10

As seen from table 4.11, more than half of the households (57.6%) have employment as their main source of income. The p-values in table 4.20 indicate a significance in the responses of the households related to their income levels, sources of income, stability of income and changes in income. The results indicate a better level of employment than what was found in 2016. The findings of the previous study stated that 48.7% of adults in Lesotho are employed with 27.6% working full time and 21.1 % casual or part time (Crush, 2016). Only 3% of the HOMP indicated that the mushroom production is their main source of income, and their income bracket is also between M1 – M3000. This implies that the mushroom production project is a means of supplementary income for all the other households, as it can barely be a sole income. In food production there is always the issue of vulnerability, and it is to the

benefit of these people that they have different sources of income. Through the provision of income and improved nutrition, successful cultivation and trade in mushrooms can strengthen livelihood assets, which cannot only reduce vulnerability to shocks, but enhance an individual's and a community's capacity to act upon other economic opportunities and improve their QOL (Marshall & Nair, 2009).

Table 4. 12: Income indicators

Income indicators	p - value
Income levels	0.0*
The sources of income of the households	0.0*
Frequency of the stability of the source of income	0.001*
Frequency in the changes in the income of the household in the past 12 months	0.0*
Reasons for the change in income	0.42

*Significant at the 5% level

As seen from table 69.7% of HOMP have had changes in their income in the past 12 months, mostly negative changes. The findings also indicate that the HOMP are seasonally food insecure in relation to changes in income, because 45% of them have seasonal incomes and 12.1% have temporary jobs. The households might be experiencing seasonal food insecurity since they have periods where their incomes will be negatively affected.

The table also indicates that the changes in the income of the HOMP are mostly caused by the closing of the Oyster mushroom production plant, inability to work, because of health or death of the breadwinner. The mushroom project was closed from March 2016 to November 2017, because of a lack of government's funds to produce spawns for the farmers (Ministry of Agriculture and Food Security, 2018). The households that were affected by the closure, which are 21.1%, all have an income bracket of M1 – M3000. The inability to work, because of health might be a result of the average age of people involved in the Oyster mushroom production that is 51-60, as seen in the demographics (table 4.1). At the age of 50 and older it might be difficult

to find new employment and Oyster mushroom production might be crucial to these people.

4.4 TO DESCRIBE THE HOUSEHOLD FOOD SECURITY OF THE HOUSEHOLDS INVOLVED IN THE OYSTER MUSHROOM PROJECT

4.4.1 The perceptions of the respondents on household food security

This section made use of the perceptions of the respondents to assess the quality and quantity of food available to the households. Feelings of uncertainty or anxiety over food, in addition to reductions in food intake, are assessed to provide insight into the ways that families experience food insecurity. The quality and quantity of food were used to ascertain if the Oyster mushroom project has improved food availability and access. The assessment of the months of adequate food and money provision in households is used as an indicator that captures changes in the household's ability to ensure that food is available for the year (Bilinsky & Swindale, 2010).

The food insecurity measurement cannot be done by using one indicator. Instead, a household's level of food insecurity must be determined by collecting information on a variety of specific conditions, experiences, and behaviours that serve as indicators of the different degrees of intensity of the conditions (Bickel *et al.*, 2000).

The findings in table 4.13 show that three quarters of HOMP worry that the household would not have enough food and were not able to eat the food they preferred, because of lack of money. Feelings of anxiety and uncertainty about household food supply is still considered an indicator of food insecurity. Experience and perceptions are included in the description of food insecurity, since they reveal the experiences of the individuals and households when there is uncertainty about the consistency of food availability and access, quantity and quality of the food needed to maintain a healthy lifestyle, or the need to adopt coping strategies when food is not enough (National Research Council, 2006). This definition appreciates the perceptions of the individuals and households on food insecurity and "feelings of deprivation" in individuals, which may result in responsive behaviours that can intensify the prevalence of poverty, which can affect the next generation in the long term. Some of these coping strategies are

nutritionally risky and they compromise health and productivity. The effect is mostly undesirable for the most nutritionally vulnerable household members, such as children, breastfeeding and pregnant women who have high nutrient requirements (Leroy *et al.*, 2015).

Table 4. 13: Experiences and feelings of uncertainty over food and money access (for the past 30 days) (n=33)

Anxiety and uncertainty about household food supply	YES	n	p-value
Did you worry that your household would not have enough food	75.8%	25	0.005*
Food quality			
Were you or any household member not able to eat the kind of food you preferred because of lack of money	75.8%	25	0.005*
Did you or any household member eat just a few kinds of food day after day owing to lack of money	69.7%	23	0.035*
Did you or any household member eat food that you preferred not to eat because of lack of money	63.6%	21	0.163
Food quantity			
Did you or any household member eat a smaller meal than you felt you needed because there was not enough	42.4%	14	0.487
Was there ever no food at all in your household because there was no money to get more	9.1%	3	0.000*
Did you or any household member go to sleep at night hungry because there was not enough food	3.0%	1	0.000*
Did you or any household member go a whole day without eating anything because there was no food	3.0%	1	0.000*

*Significant at the 5% level, p-value of 0.05

The findings indicate that the food insecurity in this instance is related more to the quality of the food rather than quantity. Both the quality and quantity of food are related to availability and access (FAO, 2019). Although the people have enough food, the challenge experienced, is the quality. In correlation with previous findings, low-income earners and the poor in Lesotho struggle to meet their minimum daily requirements for

food intake, as they can only access poor quality foods with low micronutrient content. This is a result of the country's high national and extreme poverty rates that has a substantial effect on the people's access to food. Lesotho's poverty profile has not changed over the past decade, and poverty is not only high, but also deep and its depth has increased over time. An estimated 57% of the population live below the poverty line, and 30% are below the food poverty line, with expenditures below minimum food requirements (World Bank, 2015).

Notwithstanding the fact that respondents indicated they feel food insecure, with the exception of one respondent, the respondents of HOMP don't go to bed hungry. Although not satisfied with the variety, quantity and quality of their food, they are more food secure than many other people in Lesotho, compared to the mentioned studies above.

Table 4. 14: Experience of lack of money or food such that there was not enough food to eat for a specific month over the past 12 months

Months	Severe	Moderate	Enough	p – value
January	12.1%	72.8%	15.1%	0.090
February	15.1%	72.8%	12.1%	0.397
March	15.1%	72.8%	12.1%	0.106
April	18.2%	69.8%	12.2%	0.030*
May	15.2%	69.7%	15.2%	0.092
June	15.1%	67.6%	18.3%	0.366
July	15.1%	63.7%	21.3%	0.224
August	21.3%	63.7%	15.1%	0.243
September	18.2%	69.8%	12.1%	0.343
October	21.3%	66.7%	12.1%	0.397
November	24.2%	63.7%	12.1%	0.603
December	24.3%	60.6%	15.1%	0.429

*Significant at the 5% level, p-value of 0.05.

Table 4.14 indicates that the HOMP feel they had moderate access to food and money for the past 12 months (August 2017 to July 2018). However, up to 24% of the respondents indicated a severe lack of food. This implies food insecurity, since the access to food and money was never experienced to be enough. Considering the fact that statistical analysis did not indicate the results of this table to be significant, it might be feasible to rather concentrate on the general message in these results. Between

60.6% and 72.8% of the respondents indicated that their families had moderately adequate food in the last 12 months. The bigger concern is about the 12.1% to 24.3% that indicated an experience of severe lack of food. Crush (2016) found that households in the urban areas are food secure for 7 to 8 months in a year. The proportion of households in that study reported having an adequate supply of food over the previous year declined from 73% in December 2007 to 45% in June 2008, and remained around 50% for the rest of the year (Crush, 2016). It might be that the HOMP respondents have a different perception of what it is to have a lack of enough resources to acquire food.

The results of this study differ as the respondents experienced a more severe lack of adequate food starting in August and increased to the highest need in November and December. This may be a result of low incomes (Table 4.11) and that 45.5% of the HOMP have seasonal sources of income. In addition, 12.1% of the HOMP only have casual sources of income. This implies that during some months, there is little or no income to purchase food and other needs of the household. This may suggest that they are experiencing seasonal food insecurity. Seasonal food insecurity is often of limited duration and it can also be seen as recurrent. It occurs when there is a cyclical pattern of insufficient availability and access to food. This is associated with seasonal fluctuations in the climate, cropping patterns, work opportunities or employment (as is suggested in this study) and disease (FAO, 2008).

No significant results on a 5% level, with the exception of April, were indicated for lack of money to acquire food. The Oyster mushroom project was not running from March 2016 to November 2017. This may be partly accountable for the severe lack of adequate food starting in August and increasing to the highest need in November and December.

Table 4. 15: Coping strategies and number of meals eaten by the household the previous day (n=33)

Members of the household who get less food when there is not enough food	
Children younger than 5years	0.0%
Children between 5 and 18 years	0.0%
Female adults older than 18 years	87.9%
Food is shared equally among all members	12.1%
p-value	0.04*
Number of meals eaten by adults yesterday	
One	0.0%
Two	15.2%
Three	78.8%
Four	6.0%
Five	0.0%
p-value	0.0*
Number of meals eaten by children yesterday	
One	3.0%
Two	3.0%
Three	57.6%
Four	7.1%
Five	3.0%
No children in the home	27.3%
p-value	0.0*

*Significant at the 5% level.

It is evident from table 4.15 that 87.9% of HOMP agree that the female adults eat less food when there is not enough. The findings deduce that women older than 18 years are the most vulnerable in the household when the food is not enough. This is in agreement with a study that indicated it was female adults who get less food to eat when there is not enough food for every member of the household. Furthermore, it is in the nature of a mother to feed her family first before helping herself (Swanepoel *et al.*, 2018).

The respondents also reported that 84.9% of the adults and 67.6% of the children had three or more meals the previous day. These findings only partly correlate with the

findings by Swanepoel *et al.* (2018), which stated that in Cape Town, 51% of adults and 85.7% of children had three or more meals the previous day to the survey. Since the age of the children is not indicated, it can be assumed that 3% of the households whose children had only one meal, have breastfed children.

The seemingly lower percentage of the children who had less food is due to the fact that 27.3% households who completed the questionnaire does not have children. It is not established whether the 15.2% where the adults had two meals the previous day, had only two, because there was no food for a third meal, or because it is a pattern in these families. If the answers in table 4.14 give an indication, it should be considered that they did not have the third meal, because there was no food for the third meal. In general, the conclusion can be made that 15% of the HOMP did not have enough food for three meals, but nobody had to go without food or with only one meal the previous day. It can be accepted then, that it would be the case on most other days as well.

4.4.2 Dietary diversity and food consumption

Dietary diversity is important to food security, as it measures diversity of food consumption, as well as the household's access to a variety of food groups and therefore is an indicator of adequacy of the diet (Kennedy *et al.*, 2011). It reflects the access to the adequate intake of nutrients by the households to alleviate nutritional problems, therefore preventing diseases and encouraging productivity of the households (Kennedy, 2009).

This section discusses the food groups consumed by the households the previous day and 7 days prior to the day of data collection. The sources and expenditure of the different food groups are discussed to describe their food security. These constructs partly address food access, as deals with the individual's ability to have adequate resources for acquiring appropriate foods for a nutritious diet. It addresses the affordability and allocation of food, as well as the preferences of individuals and households. Food access is both economic and physical. Access depends on affordability of food to the households or has resources, such as land to produce food. Households with enough resources will not be affected by local food shortages and unstable harvests as their food access will be sustained (Sassi, 2018).

In table 4.16 the percentages of food groups consumed by the households the previous day are shown. It can be seen that oils and fats, beverages, sugars, maize, cereals (which include wheat), and vitamin-rich vegetables were mostly consumed by the households. Low levels of protein food were consumed the previous day. Within developing countries, the amount of protein consumed is insufficient in comparison with requirements (Schönfeldt & Hall, 2012).

It can be seen that red meat alone or with offal, red meat without offal, venison or wild game and other meats were consumed in low levels or not at all. The protein sources that are mostly consumed are poultry, eggs, legumes, nuts and seeds. These findings are in agreement with the findings by Komatsu and Kitanishi (2015), which stated that the most consumed protein sources in southern Ghana are poultry and beans. The findings also indicated that 90.9% of HOMP consume vitamin-rich fruits and vegetables. Most probably because some of the households (48.5%) produce vitamin-rich fruits and vegetables (Table 4.18).

Table 4. 16: Food groups consumed by the household the previous day (n=33)

Food Items	Yes	No	p – value
Maize	69.7%	30.3%	0.035*
Other cereals	66.7%	33.3%	0.08
Roots and tubers	51.5%	48.5%	1.00
Vitamin-rich fruits and vegetables ¹	90.9%	10.1%	0.0*
Red meats alone or with offal	27.3%	72.7%	0.014*
Red meat : venison or wild game	12.1%	87.9%	0.000*
Red meat without offal	12.1%	87.9%	0.000
Poultry	51.5%	45.5%	1.000
Other meats	18.2%	81.8%	0.000*
Fish	27.3%	72.7%	0.014
Eggs	48.5%	51.5%	1.000
Legumes, nuts and seeds	60.6%	39.4%	0.296
Dairy	48.5%	51.5%	1.000
Oils and fats	97.0%	3.0%	0.000*
Sugars	87.9%	12.1%	0.000*
Beverages	87.9%	12.1%	0.0*

*Significant at the 5% level.

These findings are in correlation with indications that Lesotho's diet mainly consists of cereals, primarily maize, followed by wheat and sorghum. The increasing consumption of rice by the urban middle-income group is popularising it. In addition to the staples are starchy roots (potatoes), fruit and vegetables. Cereals provide more than 75% of the dietary energy supply. Lesotho is vulnerable to climatic and economic shocks, as the production of the staples has decreased and there is heavy reliance on cereal imports. There is also a prevalence of low protein intake. Food insecurity is mainly brought about by the low cereal harvests, low income and rising staple food prices in the country (FAO, 2010). Mushrooms are a source of protein and the mushroom production can be a valuable source of protein, in addition to the income it can generate. It is interesting to note that most of the families consumed fat, sugar and beverages, which are fairly expensive and much lower on the priority list in terms of nutrient requirements. This correlates to the global shift in diets where people are

consuming food higher in fat and sugar. Africa is also experiencing a global shift in diets where there is an increased consumption of processed foods, high utilisation of edible oils and sugar sweetened foods (Popkin, Adair & and Ng, 2012).

The frequency of food groups consumed in the past 7 days is presented in Table 4.17. It is evident that the food groups that were most consumed were maize (72.7%), fruits and vegetables (93.9%), legumes (78.8%), oils and fats (72.8%) and beverages (81.9%). The most consumed protein sources are eggs (60.6%), legumes (78.8%), fish (60.6) and poultry (54.5%). The findings are similar to the findings on the food groups consumed the previous day in table 4.16, especially in relation to the most frequently consumed protein sources and maize. The high percentage of the respondents who often consume legumes is an important positive.

Maize from the energy food group is used by most households. Fruits and vegetables from that group are used very often. In the protein group, the results portray that meat (with the exception of poultry) was almost never consumed and that eggs and legumes are used to fill the need for the protein food group. It is interesting that oils, fat, sugar and beverages were used often and very often. It is a concern that the important protein food group is used significantly low. The production of the Oyster mushrooms can compensate and fill this need and also the gap in the market.

Table 4. 17: Food groups consumed in the past 7days

Food Items	Almost Never	Rarely	Sometimes	Often	Very Often	p - value
Maize	9.1%	6.1%	12.1%	24.2%	48.5%	0.001*
Other cereals	21.1%	6.1%	30.3%	30.3%	12.1%	0.101
Roots and Tubers	3.0%	18.2%	21.2%	33.3%	24.2%	0.089
Fruits and vegetables	3.0%	3.0%	0.0%	21.2%	72.7%	0.000*
Red meats alone or with offal	27.3%	27.3%	30.3%	9.1%	6.1%	0.070
Red meat: venison or wild game	71.8%	6.1%	15.2%	0.0%	0.0%	0.000*
Red meat without offal	54.5%	21.2%	18.2%	3.0%	3.0%	0.000*
Poultry	6.1%	24.2%	15.2%	21.2%	33.3%	0.144
Other meats	66.7%	15.2%	12.1%	3.0%	6.0%	0.000*
Fish	18.2%	24.2%	36.4%	6.1%	15.2%	0.079
Eggs	15.2%	6.1%	18.2%	39.4%	21.2%	0.000*
Legumes, nuts and seeds	3.0%	0.0%	18.2%	39.4%	39.4%	0.006*
Dairy	18.2%	12.1%	21.2%	39.4%	9.1%	0.055
Oils and fats	12.1%	0.0%	15.2%	36.4%	36.4%	0.076
Sugars	15.2%	3.0%	12.1%	36.4%	33.3%	0.009*
Beverages	6.1%	0.0%	12.1%	45.5%	36.4%	0.003*

*Significant at 5% level.

The findings in table 4.18 show that most households bought almost all the food groups from a store. Approximately half (45.5%) of the households produce their own fruits and vegetables and 51.5% get venison or wild game from their relatives and other farmers. A positive observation made from the table is that local production (own production, relatives, neighbours and other farmers) are a substantial source of the protein food group: red meat, poultry, eggs, legumes and dairy products. This, in addition to the production of fruits and vegetables, is most probably the reason that

the people, even though they earn low income, can still afford to eat the important, but expensive food groups.

The high dependence on buying most food groups may be an indicator of food access, since the households are vulnerable to price increases. According to Grace *et al.* (2014), the price of food serves as one measure of access. In developing countries poor people generally spend about 75% of their income on food. As food prices go up they are forced to purchase less food. At first, a decreased dietary diversity occurs, followed by a reduction in the amount of basic food staples and water.

According to the South African food-based dietary guidelines, released in 2012, it is recommended that the consumption of a daily diet must contain diverse food groups. Unfortunately, even when the most basic and low-cost food items are selected to make up a recommended daily diet, the associated costs are still unaffordable to the poor individuals residing in South Africa, and according to the results it also applies to Lesotho. Poor households in South Africa are forced to choose mainly maize meal porridge, with limited diversity of food groups, due to low household incomes. The food quantities may categorise them as food secure, but the low quality has nutritional limitations, such as unvaried diets which may have severe implications in terms of their health and overall QOL (Schönfeldt *et al.*, 2013).

Table 4. 18: Source of food groups consumed by HOMP

Food Items	At store	Own Production	Relatives	Employer	Neighbours or other farmers	p-value
Maize	84.8%	12.1%	3.0%	0.0%	0.0%	0.000*
Cereals	87.9%	6.1%	6.1%	0.0%	0.0%	0.000*
Roots and tubers	48.5%	45.5%	0.0%	0.0%	6.1%	0.004*
Fruits and vegetables	48.5%	48.5%	6.1%	0.0%	12.1%	0.000*
Red meat alone or with offal	48.5%	12.1%	9.1%	0.0%	30.3%	0.000*
Red meat : venison or wild game	12.1%	6.1%	51.5%	0.0%	30.3%	0.000*
Poultry	48.5%	12.1%	9.1%	0.0%	30.3%	0.004*
Other meats	81.8%	3.0%	9.1%	6.1%	0.0%	0.000*
Fish	72.7%	6.1%	6.1%	6.1%	9.1%	0.026*
Eggs	54.4%	9.1%	3.0%	0.0%	33.3%	0.000*
Legumes	57.6%	9.1%	15.2%	0.0%	18.2%	0.000*
Dairy	75.8%	0.0%	0.0%	3.0%	21.2%	0.000*
Oils and Fats	100.0%	0.0%	0.0%	0.0%	0.0%	0.000*
Sugars	100.0%	0.0%	0.0%	0.0%	0.0%	0.000*
Beverages	100.0%	0.0%	0.0%	0.0%	0.0%	0.000*

*Significant at 5% level.

Furthermore, it is evident from the findings in table 4.19 that most households spend M0-100 on most of the food groups (maize, cereals, roots and tubers, fruits and vegetables, other meats, eggs, dairy, oils and fats, sugars and beverages). This excludes red meat alone with offal (12.1%), red meat: venison and wild game (3.0%), poultry (30.3%), fish (42.4%) and legumes (48.5%), where less than half of the households spend M0-100 per month. These are fairly expensive foods and they

therefore have to spend more on them. A high percentage (72.7%) indicated that they spend M401-500 on red meat, venison or wild game. This is unexpected, as more than half of the respondents earn less than M3000 per month. It gives an indication of how important red meat is to the respondents, considering the fact that other protein sources are less expensive and still provide the same nutritional benefit. This makes the researcher doubt the management of the monthly income of these families. This might also be related to the respondents' perceptions of not having sufficient money to buy food. If you buy expensive commodities with low income, you won't have money to buy enough in your own eyes. The responses are statistically significant since the p-values are below 5%. According to Mchiza *et al.* (2015), red meat is among the most expensive food items in South Africa and as a result it is not affordable to poorer communities.

In the Maseru district, it was reported that the food security situation has deteriorated mainly due to poor agriculture, as well as poor harvest of main crops (maize, sorghum and wheat) in 2017/18 compared to the previous year, with a reduction in maize production estimated at 62.6%. Among the things that need constant monitoring for the food security and wellbeing of the households are: prices of maize meal and other basic food commodities (such as vegetable oil and pulses) and water availability for domestic uses (LVAC, 2018).

Table 4. 19: Expenditure on different food groups per month

Food groups	M0-100	M101-200	M201-300	M301-400	M401-500	M501-600	M601-700	M701-800	p-value
Maize	81.8%	18.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0*
Cereals	75.8%	18.2%	3.0%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0*
Roots and tubers	57.6%	18.2%	12.1%	9.1%	3.0%	0.0%	0.0%	0.0%	0.0*
Fruits and Vegetables	69.7%	24.2%	3.0%	3.05	0.0%	0.0%	0.0%	0.0%	0.0*
Red meat alone or with offal	12.1%	60.6%	9.1%	6.1%	12.1%	0.0%	0.0%	0.0%	0.0*
Red meat venison or wild game	3.0%	12.1%	12.1%	27.3%	72.7%	0.0%	0.0%	0.0%	0.0*
Poultry	30.3%	18.2%	12.1%	33.4%	0.0%	0.0%	3.0%	3.0%	0.0*
Other meats	75.8%	12.1%	6.1%	6.0%	0.0%	0.0%	0.0%	0.0%	0.0*
Fish	42.4%	15.2%	15.2%	18.2%	9.1%	0.0%	0.0%	0.0%	0.0*
Eggs	72.7%	24.2%	0.0%	0.0%	3.0%	0.0%	0.0%	0.0%	0.0*
Legumes	48.5%	36.4%	6.1%	6.1%	3.0%	0.0%	0.0%	0.0%	0.0*
Dairy	54.5%	39.4%	3.0%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0*
Oils and Fats	72.7%	24.2%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0*
Sugars	90.9%	6.1%	0.0%	0.0%	3.0%	0.0%	0.0%	0.0%	0.0*
Beverages	72.7%	24.2%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0*

*Significant at the 5% level.

The prices of typical items bought from the store used by HOMP are summarised in table 4.20. The prices complement the results in table 4.16 that indicated that among the items that the HOMP mostly spend on are fish, red meat and poultry.

Table 4. 20: Price list of basic food items in Maseru

Item	Quantity	Price (M)
Bread	Loaf	8.00
Maize	1kg	12.00
Potatoes	1kg	16.00
Carrots	1kg	12.00
Pumpkin	1kg	15.00
Tomatoes	1kg	23.00
Offal	1kg	20.00
Red meat	1kg	65.00
Venison or wild game	1kg	80.00
Poultry	1kg	35.00
Eggs	1 tray (30 eggs)	48.00
Milk	1 litre	12.00
Sugar	1kg	19.00
Oil	750ml	18.00
Dry legumes	1kg	18.00
Fish	1 kg	40.00

(Shoprite Sefika Complex, August 2018).

4.6 SUMMARY OF FINDINGS

It is evident from the results that the respondents were mostly middle aged married women. These households take more than 30 minutes to access most facilities, except for a shop where basic items can be bought. None of these households have health insurance, although they seemingly have sufficient access to health facilities, as 72.7% received health care without staying overnight in the past 6 weeks. The HOMP mainly use piped water as their main source of water for cooking and drinking. More than half of the households use Liquefied Petroleum Gas (LPG) for cooking, making it the most used cooking fuel followed by kerosene and electricity. Pit latrines are used by more than half of the households and are located in the yard/plot, the others have flush toilets in the house.

The findings also indicated that most households have enough food, but it is assumed based on the findings that insufficient quantities of proteins and other food groups

were experiences in some households and this would affect the quality in the nutritional value of the food consumed. Some respondents (varied between 12 and 24%) experienced a severe lack of adequate food, while 14.4% households indicated enough money and food over the 12 month period. However, none of the households had to go a whole day without a meal.

The households consume low levels of protein and mostly consume maize, cereals, fats and oils, beverages, sugars, and vitamin-rich fruits and vegetables. Local production (own production, relatives, neighbours and other farmers) are a substantial source of the protein food group: red meat, poultry, eggs, legumes and dairy products. This, in addition to the production of fruits and vegetables, is most probably the reason that the people, even though they earn a low income, can still afford to eat the important but expensive food groups. More than half of the households have employment as their main source of income. There is 3% of the HOMP that have mushroom production as their main source of income, whose income bracket is M1 – M3000, but for all the other households, mushroom production is a supplementary income.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

This chapter presents the conclusions drawn from the results and analysis, together with the recommendations. The general objective of the study was to describe the quality of life (QOL) and food security of the households involved in the Oyster mushroom project in Maseru.

5.1.1 Indicators of quality of life of the participants in the Oyster mushroom project

5.1.1.1 Health

It is concluded that health care facilities are available when required by the households involved in the Oyster mushroom project. This implies good QOL in relation to access to health care facilities. However the percentage of HOMP that received care from health services (although without staying overnight) is high (72.7%), and this is an indication of a high prevalence of diseases and the high need for medical help, which suggests that they have poor QOL.

None of the HOMP have medical insurance schemes, because most of them have low income levels. Consequently, HOMP (78.8%) spend part of their income on health related items. Arthritis, high blood pressure, influenza and pain were the main reasons most households bought health related items 4 weeks prior to the survey. Influenza is highly prevalent in Lesotho, because of the winter season (coincided with data collection), while arthritis and high blood pressure are related to age and most of the respondents are middle age and older people. This is an indicator of poor QOL among the older people involved in Oyster mushroom production in Maseru, as the prevalence of hypertension in Lesotho is 37.6% (Thinyane *et al.*, 2015). It is concluded that the mushroom project can supplement their income which can enable them to acquire health related items.

5.1.1.2 Water Access

It is concluded that HOMP have good access to water in relation to their water sources. The majority of them have water sources in their yards and take less than 5 minutes

to go and return from the water source. It can be concluded that where less time spent on collecting water can translate into more time available for income generation activities which can indirectly enhance food security. The HOMP mainly use improved water sources, as they use piped water for drinking and cooking which will contribute to good health. The responses related to the treatment of water before drinking are statistically insignificant. It can be assumed that the respondents do not treat water as they consider it safe, and it most probably is safe as they did not indicate any disease related to polluted water.

5.1.1.3 Sanitation

The HOMP have good QOL in relation to sanitation facilities, as they mainly use pit latrines (57.6%) and piped systems that are connected to the sewer line (42.4%) that are located in the yard. These are classified as improved sanitation facilities as they restrict contact with human waste, consequently reducing the transmission of typhoid, cholera and other diseases. The majority (84.8%) of the households do not share toilet facilities and this is an indicator of good QOL, as this suggests that they have safe and hygienic toilet facilities.

5.1.1.4 Food Preparation and kitchen facility

It is concluded that HOMP have good QOL and food security in relation to cooking facilities. The households mainly use Liquefied Petroleum Gas (LPG), electricity and kerosene with the more than half (54.2%) using LPG. The households do not use energy sources that have a negative effect on health and the environment, such as biomass. Except for one household, all have a separate room (kitchen) for food preparation.

5.1.1.4 Household Income

It is concluded that more than half (51.2%) of HOMP have low income levels and mostly depend on employment for their income. One household depends on mushroom production only, the other households get supplementary income from the

Oyster mushroom project. In this study, 69.5% of the households are seasonally food insecure in relation to the stability of their income. The unemployment and closing down of the mushroom plant during some months may have resulted in seasonal food insecurity. Other negative changes in their income resulted from the inability to work, because of health or the death of the breadwinner. However, it is to the benefit of these people that they have different sources of income. It can be concluded that supplementary income from the Oyster mushroom project contributes towards livelihood diversification which maybe a way of coping under stressful conditions and it may be undertaken to enhance food security.

5.1.2 The household food security of the households involved in the oyster mushroom project

5.1.2.1 The perceptions of the respondents on the household food security.

The responses of HOMP on their feelings and perceptions of the quantity and quality of their food are statistically significant. However, it seems that the food insecurity of the HOMP is related to quality rather than quantity. The responses of HOMP related to their experiences of lack of money or food, such that there was not enough food to eat for a specific month over the past 12 months, are statistically insignificant with the exception of April. However, the general implication is that HOMP feel that they had moderate access to food and money for the past 12 months. Close to a quarter of them indicate severe lack of food. This is an indicator of food insecurity since access to food and money was never experienced to be enough. The responses may be statistically insignificant, because the HOMP respondents have different perceptions of what it is to have lack of resources to acquire food.

It is concluded from the responses on the coping strategies that female adults eat less food when there is not enough, as it is the nature of a mother to feed her family first before helping herself. It is also concluded that 15% of HOMP did not have enough food for 3 meals, but no one had to go a day without food or with only one meal on the previous day. It can be accepted that it would be the case on other days as well.

5.1.2.2 Dietary diversity and food consumption

It is concluded that the food groups are not evenly consumed, some food groups (oils and fats, sugars, maize, other cereals (which include wheat), and vitamin rich vegetables) are more frequently consumed, while some are not consumed often (poultry, other meats, eggs, dairy, fish). This is an indicator of food insecurity among HOMP and might indicate a lack in dietary diversity. The food groups that were mostly consumed the previous day and the past 7 days prior the survey were oils and fats, sugars, maize, other cereals (which include wheat), and vitamin rich vegetables. The consumption of protein was low, although a high percentage of the respondents who consumed legumes in the 7 days prior to the survey, was an important positive. The HOMP have good access to vitamin rich fruits and vegetables and protein (red meat, poultry, eggs and legumes) as local production (own production, relatives, neighbours and other farmers) is a substantial source of these food groups. The protein rich food are available, but they can't afford to eat it regularly. The HOMP can afford other expensive foods such as red meat, venison and wild game, oils and fats and beverages occasionally, even though their income level is low. However there is a high dependence on buying food items and this makes HOMP vulnerable to food price increases. It is concluded that participating in the Oyster mushroom project can contribute to food access as the engaged households will have mushrooms in their gardens and the community that is sold to can access the mushrooms without travelling long distances to the source. The rich protein content of mushrooms will also contribute to the nutrition and health of the community.

5.2 RECOMMENDATIONS

5.3.1 Recommendations for respondents

Value adding to the Oyster mushrooms by the respondents to increase shelf life and income generated from the project.

5.3.2 Recommendations for authorities

The sustainable operation of the Oyster mushroom project is recommended as the project has the potential to significantly enhance household food security.

Extension programs informing the consumers in Lesotho on the nutritional value of the Oyster mushroom and recipes to introduce it to their meal pattern, can be valuable for the consumers and the Oyster mushroom producers.

5.5.3 Recommendations for further research

Further research that adds the qualitative component such as focus groups and/or case studies where perceived QOL and benefits of the project will be further explored. Further research can also be done on the management and implementation of the project to enhance sustainability. The impact of the project can also be studied over time.

It is recommended that a study that is inclusive of all the households involved in Oyster mushroom production in Lesotho be done, since the number of households engaged in the project has increased, and is not limited to Maseru. This will provide important information on the food security and QOL of all the households involved.

Furthermore, research that compares the results of the households involved in Oyster mushroom production with the control group, is recommended to assess the impact of the project on food security and QOL of the households involved.

Further research on the perceptions and acceptance of Oyster mushroom as part of the Basotho diet is recommended, as this may influence the impact of the project on food security and QOL of the Basotho nation. It seems that they produce Oyster mushroom to gain income, but don't eat it regularly as a source of protein food, because they have accepted it as a source of income and not yet as part of their regular meal pattern.

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ANNEXURE A: ETHICAL CLEARANCE LETTER



Faculty of Natural and Agricultural Sciences

10-Oct-2018

Dear Dr Natasha Cronje

Ethics Clearance: The effects of the oyster mushroom production on the food security and quality of life of the engaged households in Maseru, Lesotho.

Principal Investigator: Dr Natasha Cronje

Department: Consumer Science Department (Bloemfontein Campus)

APPLICATION APPROVED

This letter confirms that a research proposal with tracking number: UFS-HSD2018/1171 and title: 'The effects of the oyster mushroom production on the food security and quality of life of the engaged households in Maseru, Lesotho.' was given ethical clearance by the Ethics Committee.

Your ethical clearance number, to be used in all correspondence is: UFS-HSD2018/1171

Please ensure that the Ethics Committee is notified should any substantive change(s) be made, for whatever reason, during the research process. This includes changes in investigators. Please also ensure that a brief report is submitted to the Ethics Committee on completion of the research.

The purpose of this report is to indicate whether or not the research was conducted successfully, if any aspects could not be completed, or if any problems arose that the Ethics Committee should be aware of.

Note:

1. This clearance is valid from the date on this letter to the time of completion of data collection.
2. Progress reports should be submitted annually unless otherwise specified.

Yours Sincerely

Dr. Karen Ehlers

Chairperson: Ethics Committee

Faculty of Natural and Agricultural Sciences

Natural and Agricultural Sciences Research Ethics Committee

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ANNEXURE B: CERTIFICATE OF EDITING

Michelle Woolley

WRITER EDITOR PROOFREADER TRANSLATOR

Articles • Direct Mailing • Newsletters • Web Content/blogs • Brochure

CERTIFICATE OF EDITING

This letter certifies that I have edited the dissertation detailed below.

Title:

THE FOOD SECURITY AND QUALITY OF LIFE OF THE
HOUSEHOLDS INVOLVED IN THE OYSTER MUSHROOM PROJECT
IN MASERU, LESOTHO

Author:

Nthabeleng Nkoko

Regards
Michelle Woolley

Date: 03/12/2019

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083 298 2077

ANNEXURE C: QUESTIONNAIRE

SECTION A: DEMOGRAPHIC INFORMATION

Household number: _____

RESPONDENT COMPOSITION

1.1 Name and Surname of respondent: _____

1.2 Age of respondent:

(a) 16-20	1
(b) 21-25	2
(c) 26-30	3
(d) 31-35	4
(e) 36-40	5
(f) 41-50	6
(g) 51-60	7
(h) 61 or older	8

1.3 Respondent gender:

(a) Male	1
(b) Female	2

1.4 Respondent marital status:

(a) Married	1
(b) Widowed	2
(c) Separated/Divorced	3
(d) Never married/Single	4

1.5 Does any member of this household own the following and how many of each are in the household?

Items	How many:
(a) A watch	
(b) A mobile phone	
(c) A bicycle	
(d) A motorcycle or motor scooter?	
(e) An animal drawn cart?	
(f) A car or truck?	
(g) A boat with a motor?	

CHARACTERISTICS OF THE HOUSEHOLD

1.6 How long has the household been living in this area?

(a) Less than 5 years	1
(b) More than 5 years, but less than 10 years	2
(c) More than 10 years, but less than 20 years	3
(d) More than 20 years	4

1.7 Are there any of the following facilities within a 30 minute (2km) walk from the house?

(a) Shop where basic food can be bought	1
(b) Market to buy good foods	2
(c) Markets where you can sell goods and food	3
(d) Bank	4
(e) Post office	5

SECTION B: INCOME

2.1 How much does your household earn per month? (Average monthly income of the household)

2.2 What is your household's most important source of livelihoods?

2.3 Is the first source of income temporary, seasonal or stable?

(a) Temporary/Casual	1
(b) Seasonal	2
(c) Stable	3
(d) Social Grants	4
(e) Remittances	5

2.4 Has the income of your household changed in the past 12 months?

(a) Yes	1
(b) No	2

2.5 If yes to question 2.22, by how much has it changed per month?

(a) Increased	1
(b) Decreased	2

2.6 Have you received any support in the past 12 months in cash or food or both?

(a) Yes	1
(b) No	2

SECTION C: HEALTH

3.1 In the last 6 months, was any member admitted overnight to stay at a health facility?

(a) Yes	1
(b) No	2

3.2 If yes to question 3.1, please provide details in the table below:

Who (E.g. member 1, 2, 3)	Reason	Money paid or medical	How much

3.3 If the last 4 months, did any member receive care from a health provider, pharmacy, traditional healer without staying overnight?

(a) Yes	1
(b) No	2

3.4 If yes to question 3.3, please provide details in the table below:

Who (E.g. member 1, 2, 3)	Reason	Money paid or medical	How much

3.5 Is anyone covered by any health insurance?

(a) Yes	1
(b) No	2

3.6 If yes to question 3.5, what is the main type of health insurance?

3.7 Sometimes people buy vitamins, medicines, and herbal remedies without consulting with a health provider, pharmacy, or traditional healer. They may also buy other health-related items such as band-aids/plasters, thermometers, or other medical devices, and so on without a consultation. In the last 4 weeks, was money spent on these types of health-related items for members of your household?

(a) Yes	1
(b) No	2

3.8 If yes to question 3.7, what items were bought?

3.9 For what reasons was these items bought?

SECTION D: WATER ACCESS	
--------------------------------	--

4.1 What is the main source of drinking water for members of your household?

(a) Piped water	1
Piped into dwelling	2
Piped to yard/plot	3
Piped to neighbor	4
Public tap/standpipe	5
(b) Tube well or borehole	6
(c) Dug well	7
Protected well	8
Unprotected well	9
(d) Water from spring	10
Protected spring	11
Unprotected spring	12
(e) Rain water	13
(f) Tanker truck	14
(g) Cart with small tank	15
(h) Surface water (River/Lake/Dam)	16
(i) Bottled water	17

4.2 What is the main source of water used by your household for other purposes such as cooking and handwashing?

(a) Piped water	1
Piped into dwelling	2
Piped to yard/plot	3
Piped to neighbor	4
Public tap/standpipe	5
(b) Tube well or borehole	6
(c) Dug well	7
Protected well	8
Unprotected well	9
(d) Water from spring	10
Protected spring	11
Unprotected spring	12
(e) Rain water	13
(f) Tanker truck	14

(g) Cart with small tank	15
(h) Surface water (River/Lake/Dam)	16
(i) Other	17

4.3 Where is that water source located?

(a) In own dwelling	1
(b) In own yard/plot	2
(c) Elsewhere	3

4.4 How long does it take to go there, get water and come back? (In minutes)

4.5 In the past 2 weeks, was the water from this source not available for at least one full day?

(a) Yes	1
(b) No	2

4.6 Do you do anything to the water to make it safer to drink?

(a) Yes	1
(b) No	2

4.7 If yes to question 4.6, what do you usually do to make the water safer to drink?

SECTION E: TOILET ACCESS

5.1 What kind of toilet facility do members of your household usually use?

(a) Flush to piped sewer system	1
(b) Flush to septic tank	2
(c) Flush to pit latrine	3
(d) Flush to somewhere else	4
(e) Flush, don't know where	5
(f) Composting toilet	6
(g) Bucket toiler	7
(h) Hanging toilet/hanging latrine	8
(i) No facility/Bush/Field	9

(j) Pit latrine	10
Ventilated improved pit latrine	11
Pit latrine with slab	12
Pit latrine without slab/open pit	13
(k) Other	14

5.2 Do you share this toilet facility with other households?

(a) Yes	1
(b) No	2

5.3 If yes to question 5.2, including your own household, how many households use this toilet facility?

5.4 Where is this toilet facility located?

SECTION F: FOOD PREP AND HOUSE

6.1 What type of fuel does your household mainly use for cooking?

(a) LPG	1
(b) Natural gas	2
(c) Biogas	3
(d) Kerosene	4
(e) Coal, Lignite	5
(f) Charcoal	6
(g) Wood	7
(h) Straw/Shrubs/Grass	8
(i) Agricultural crop	9
(j) Animal dung	10

6.2 Is the cooking usually done in the house, in a separate building, or outdoors?

(a) No food cooked in household	1
(b) In the house	2
(c) In a sperate building	3
(d) Outdoors	4

6.3 Do you have a separate room which is used as a kitchen?

(a) Yes	1
(b) No	2

6.4 Does your household have the following:

(a) Electricity	1
(b) A radio	2
(c) A television	3
(d) A non-mobile telephone	4
(e) A computer	5
(f) A refrigerator	6

6.5 What are the perceived indicators of quality of life?

SECTION G: FOOD SECURITY

7.1 Did you worry that your household would not have enough food (in the past 30 days)?

(a) Yes	1
(b) No	2

7.2 Were you or any household member not able to eat the kinds of food you preferred because of a lack of money?

(a) Yes	1
(b) No	2

7.3 Did you or any household member eat just a few kinds of food day-after-day owing to a lack of money?

(a) Yes	1
(b) No	2

7.4 Did you or any other household member eat food that you preferred not to eat because of a lack of money?

(a) Yes	1
(b) No	2

7.5 Did you or any household member eat a smaller meal than you felt you needed because there was not enough?

(a) Yes	1
(b) No	2

7.6 Did you or any other household member eat fewer meals in a day because there was not enough food?

(a) Yes	1
(b) No	2

7.7 Was there ever no food at all in your household because there was not money to get more?

(a) Yes	1
(b) No	2

7.8 Did you or any household member go to sleep at night hungry because there was not enough food?

(a) Yes	1
(b) No	2

7.9 Did you or any household member go a whole day without eating anything because there was no food?

(a) Yes	1
(b) No	2

7.10 In which of the last 12 months did you experience a lack of food or money such that you did not have enough food to eat.

Please rate the months from 1 (Very bad – struggled a lot with lack of food or money) to 10 (Very good – didn't struggle at all with food or money).

January	1	2	3	4	5	6	7	8	9	10
	Very bad month					Very good				
February	1	2	3	4	5	6	7	8	9	10
	Very bad month					Very good				
March	1	2	3	4	5	6	7	8	9	10
	Very bad month					Very good				

	Very bad month									Very good
	month									
April	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
May	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
June	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
July	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
August	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
September	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
October	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
November	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										
December	1	2	3	4	5	6	7	8	9	10
	Very bad month									Very good
month										

FOOD CONSUMPTION

Maize

7.11 Did you or anyone in the household eat Maize or maize products yesterday?

(a) Yes	1
(b) No	2

7.12 How frequently did you consume maize or maize products within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.13 Where do you get your maize products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) employer	4
(e) Neighbours/other farmers	5

7.14 What is your average expenditure on maize products per month? _____

Other cereals (Wheat, bread, breakfast cereals, sorghum, rice, pasta, oats etc.)

7.15 Did you or anyone in the household eat other cereals yesterday?

(a) Yes	1
(b) No	2

7.16 How frequently did you consume other cereals within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.17 Where do you get your other cereals products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.18 What is your average expenditure on other cereals per month? _____

Root and tubers (Potato, sweet potato, yams, cassava or any other food made from roots or tubers)

7.19 Did you or anyone in the household eat roots and tubers yesterday?

(a) Yes	1
(b) No	2

7.20 How frequently did you consume roots and tubers within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.21 Where do you get your roots and tubers products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.22 What is your average expenditure on roots and tubers per month? _____

Vitamin A rich fruit and vegetables/Yellow, orange colored fruit and vegetables (Mangos, peaches)

7.23 Did you or anyone in the household eat vitamin rich fruits and vegetables yesterday?

(a) Yes	1
(b) No	2

7.24 How frequently did you consume vitamin rich fruits and vegetables within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.25 Where do you get your vitamin rich fruits and vegetables products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.26 What is your average expenditure on vitamin rich fruits and vegetables per month?

Other fruits (apples, apricots, bananas, grapes, guava, lemon, peaches, naartjes)

7.27 Did you or anyone in the household eat other fruits yesterday?

(a) Yes	1
(b) No	2

7.28 How frequently did you consume other fruits within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.29 Where do you get your other fruits products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.30 What is your average expenditure on other fruits per month? _____

Red meat: Beef & offal alone or as part of a stew

7.31 Did you or anyone in the household eat Red meat: beef & offal alone or as part of a stew yesterday?

(a) Yes	1
(b) No	2

7.32 How frequently did you consume Red meat: beef & offal alone or as part of a stew within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.33 Where do you get your Red meat: beef & offal products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.34 What is your average expenditure on Red meat: beef & offal per month?

Red meat: Mutton, lamb, goat & offal alone or part of a stew

7.35 Did you or anyone in the household eat Red meat: Mutton, lamb, goat & offal alone or part of a stew_yesterday?

(a) Yes	1
(b) No	2

7.36 How frequently did you consume Red meat: Mutton, lamb, goat & offal alone or part of a stew_within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.37 Where do you get your Red meat: Mutton, lamb, goat & offal products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Farmers	4
(e) Neighbours/other farmers	5

7.38 What is your average expenditure on Red meat: Mutton, lamb, goat & offal per month?

Red meat: Venison, wild game including rabbits and birds

7.39 Did you or anyone in the household eat Red meat: Venison, wild game including rabbits and birds_yesterday?

(a) Yes	1
---------	---

(b) No	2
--------	---

7.40 How frequently did you consume Red meat: Venison, wild game including rabbits and birds within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.41 Where do you get your Red meat: Venison, wild game including rabbits and birds products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.42 What is your average expenditure on Red meat: Venison, wild game including rabbits and birds per month? _____

Red meat: Mutton, pork & offal alone or part of a stew

7.43 Did you or anyone in the household eat Red meat: mutton, pork & offal alone or part of a stew yesterday?

(a) Yes	1
(b) No	2

7.44 How frequently did you consume Red meat: mutton, pork & offal alone or part of a stew within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.45 Where do you get your Red meat: mutton, pork & offal products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4

(e) Neighbours/other farmers	5
------------------------------	---

7.46 What is your average expenditure on Red meat: mutton, pork & offal per month?

Red meat: Beef, mutton, venison, lamb, goat or pork NOT as part of a stew

7.47 Did you or anyone in the household eat Red meat: Beef, mutton, venison, lamb, goat or pork NOT as part of a stew yesterday?

(a) Yes	1
(b) No	2

7.48 How frequently did you consume Red meat: Beef, mutton, venison, lamb, goat or pork NOT as part of a stew within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

Poultry: Chicken & offal (Giblets, feet)

7.49 Did you or anyone in the household eat Poultry: Chicken & offal yesterday?

(a) Yes	1
(b) No	2

7.50 How frequently did you consume Poultry: Chicken & offal within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.51 Where do you get your Poultry: Chicken & offal products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.52 What is your average expenditure on Poultry: Chicken & offal per month?

Other meat: Ham, polony, cold meats, tinned meats

7.53 Did you or anyone in the household eat other meats yesterday?

(a) Yes	1
(b) No	2

7.54 How frequently did you consume other meats within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.55 Where do you get your other meats products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/ other farmers	5

7.56 What is your average expenditure on other meats per month? _____

Fish (Fresh), canned or frozen fish

7.57 Did you or anyone in the household eat Fish (Fresh), canned or frozen fish yesterday?

(a) Yes	1
(b) No	2

7.58 How frequently did you consume Fish (Fresh), canned or frozen fish within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.59 Where do you get your Fish (Fresh), canned or frozen fish products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.60 What is your average expenditure on Fish (Fresh), canned or frozen fish per month?

Eggs

7.61 Did you or anyone in the household eat eggs yesterday?

(a) Yes	1
(b) No	2

7.62 How frequently did you consume eggs within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.63 Where do you get your egg products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.64 What is your average expenditure on eggs per month? _____

Legumes, nuts & seeds (baked beans, dried peas, cowpeas, peanuts, nuts, sunflower seeds & pumpkin seeds)

7.65 Did you or anyone in the household eat legumes, nuts & seeds yesterday?

(a) Yes	1
(b) No	2

7.66 How frequently did you consume legumes, nuts & seeds within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.67 Where do you get your legumes, nuts & seeds products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.68 What is your average expenditure on legumes, nuts & seeds per month?

Dairy products (milk, amasi/maas, yogurt, condensed milk, powdered milk & cheese)

7.69 Did you or anyone in the household consume dairy products yesterday?

(a) Yes	1
(b) No	2

7.70 How frequently did you consume dairy products within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.71 Where do you get your dairy products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.72 What is your average expenditure on dairy products per month? _____

Oils & Fats (oil, margarine, butter or holsum)

7.73 Did you or anyone in the household consume oils & fats yesterday?

(a) Yes	1
(b) No	2

7.74 How frequently did you consume oils & fats within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.75 Where do you get your oils & fats products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.76 What is your average expenditure on oils & fats per month? _____

Sugars (syrup, sugar, sweets, honey, chocolate & sugarcane)

7.77 Did you or anyone in the household consume sugars yesterday?

(a) Yes	1
(b) No	2

7.78 How frequently did you consume sugars within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.79 Where do you get your sugar products?

(a) Buy at store	1
(b) Own production	2

(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.80 What is your average expenditure on sugars per month? _____

Beverages (tea, coffee, cool drink, fruit juice, alcohol)

7.81 Did you or anyone in the household consume beverages yesterday?

(a) Yes	1
(b) No	2

7.82 How frequently did you consume beverages within the last 7 days?

(a) Almost never	1
(b) Rarely	2
(c) Sometimes	3
(d) Often	4
(e) Very often	5

7.83 Where do you get your beverage products?

(a) Buy at store	1
(b) Own production	2
(c) Relatives	3
(d) Employer	4
(e) Neighbours/other farmers	5

7.84 What is your average expenditure on beverages per month? _____

7.85 If there is not enough food for every member of your household, which members get less food?

(a) Children older than 5 years	1
(b) Children aged between 5 and 18 years	2
(c) Female adults older than 18 years	3
(d) Male adults older than 18 years	4

7.86 Yesterday, how many times (meals) did the adults in this household eat?

7.87 Yesterday, how many times (meals) did the children (3-6years) in this household eat?

7.88 If there is not enough food for every member of your household, which members get less food?



(a) Children older than 5 years	1
(b) Children aged between 5 and 18 years	2
(c) Female adults older than 18 years	3
(d) Male adults older than 18 years	4

7.89 Yesterday, how many times (meals) did the adults in this household eat?

7.90 Yesterday, how many times (meals) did the children (3-6years) in this household eat?

8. Which factors influenced your acceptability of oyster mushrooms as food?

ANNEXURE D: QUESTIONNAIRE (TRANSLATED)

EvaSys	The effect of the Oyster Mushroom project on Food Security in Maseru, Lesotho	
University of the Free State	MSc Consumer Science	
Consumer Science	Household Food Security & Quality of Life	

Mark as shown: Please use a ball-point pen or a thin felt tip. This form will be processed automatically.
Correction: Please follow the examples shown on the left hand side to help optimize the reading results.

1. LINTLHA TSE AKARETSANG

1.1 Nomoro ea lelapa

1.2 Lilemo tsa motho ea arabelang

- | | | |
|--------------------------------|--|--------------------------------|
| <input type="checkbox"/> 16-20 | <input type="checkbox"/> 21-25 | <input type="checkbox"/> 26-30 |
| <input type="checkbox"/> 31-35 | <input type="checkbox"/> 36-40 | <input type="checkbox"/> 41-50 |
| <input type="checkbox"/> 51-60 | <input type="checkbox"/> 61 kapa ho feta | |

1.3 Bong ba motho ea arabelang

- | | |
|---------------------------------|-------------------------------------|
| <input type="checkbox"/> Motona | <input type="checkbox"/> Mot'sehali |
|---------------------------------|-------------------------------------|

1.4 Boemo ba lenyalo

- | | | |
|--|--|---|
| <input type="checkbox"/> Ke nyetse / ke nyetsoe | <input type="checkbox"/> Ke mohlolo / mohlolohali | <input type="checkbox"/> Ke arohane le molekane |
| <input type="checkbox"/> Ha ke so kene lenyalong | <input type="checkbox"/> Ke lula le kharebe eaka / mohlankana oaka | |

Na ho na le e mong oa lelapa ea nang le lintho tse latelang

	Ee	Che
1.5 T'supa nako	<input type="checkbox"/>	<input type="checkbox"/>
1.6 Mohala oa letheka	<input type="checkbox"/>	<input type="checkbox"/>
1.7 Baesekele	<input type="checkbox"/>	<input type="checkbox"/>
1.8 Sethuthuthu	<input type="checkbox"/>	<input type="checkbox"/>
1.9 Kariki	<input type="checkbox"/>	<input type="checkbox"/>
1.10 Koloji kapa teraka	<input type="checkbox"/>	<input type="checkbox"/>
1.11 Seketsoana se ikhannang	<input type="checkbox"/>	<input type="checkbox"/>

1.12 Ke batho ba bakae ba lulang ka hare ho ntlo ee ha joale

- | | | |
|---|------------------------------|------------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2-4 | <input type="checkbox"/> 5-6 |
| <input type="checkbox"/> 7 kapa ho feta | | |

1.13 Lelapa le le fihlile sebakeng se neng

- | | | |
|--|--|---|
| <input type="checkbox"/> Nako e ka tlase ho lilemo tse hlano | <input type="checkbox"/> Nako e lipakeng tsa lilemo tse hlano le tse leshome | <input type="checkbox"/> Nako e lipakeng tsa lilemo tse leshome le tse mashome a mabeli |
| <input type="checkbox"/> Nako e fetang lilemo tse mashome a mabeli | | |

1.14 Na hona le libaka tse latelang haufinyane moo motho a tsamaeang metsotso e mashome a mararo kapa likilomitara tse peli

- | | | |
|--|---|--|
| <input type="checkbox"/> Lebenkele moo lijo tsa mantlha li rekisoang | <input type="checkbox"/> 'Maraka bakeng sa ho reka lijo | <input type="checkbox"/> 'Maraka moo u ka rekisang lijo le lintho tse ling |
| <input type="checkbox"/> Banka | <input type="checkbox"/> Poso | |

2. KUNO

2.1 Kuno ea lelapa la hao ka khoeli ke bokae? (Kakaretso ea kuno ea lelapa motho ka mong)

2.2 Mokhoa oa mantlha oo lelapa le iphelisang ka ona ke ofeng



2. KUNO [Continue]

- 2.3 Na mokhoa o oa mantlha oa kuno ke oa nakoana, ke o fapanang ka linako, kapa ke o tsitsiseng
 Oa nakoana O fapanang ka linako O tsitsiseng
 Ho phelisoa ke 'muso Limpho
- 2.4 Na kuno ea lelapa la hao e ile ea fetoha nakong ea likhoeli tse leshome le metso e mehlano tse fetileng
 Ee Che
- 2.5 Haeba karabo ea hao ho 2.4 ke ee, kuno ea hao e fetohile joang
 Ho behelloa ka thoko ho mosebetsi Ho ea phomolong ka lebaka la lilemo Lefu
 Maemo a bophelo Ho feloa ke mosebetsi
- 2.6 Na ho na le t'sebetso eo u e fumaneng nako ea likhoeli tse leshome le metso e 'meli tse fetileng, ka mokhoa oa chelete kapa lijo kapa lile peli
 Ee Che

3. BOPHELO

- 3.1 Nakong ea likhoeli tse t'seletsoeng tse fetileng, na ho na le e mong oa lelapa ea ileng a bolokoa kokelong ho fihela ka la hosane setsing sa bophelo
 Ee Che
- 3.2 Nakong ea likhoeli tse 'ne tse fetileng, na ho na le e mong oa lelapa ea ileng a fumana tlhokomelo ho tsoa setsing sa bophelo, polokelong ea lithare, ngakeng ea setso empa a sa robaletse
 Ee Che
- 3.3 Na ho na le motho ea ts'irelelitsoeng khahlanong le bokulo, 'me a lefella t'sebeletso eo
 Ee Che
- 3.4 Haeba karabo ea hao ke ee ho potsong ea 3.3, mofuta oa t'sireletso eo ke o fe
- 3.5 Ka nako tse ling batho ba reka lithare le meriana ntle le ho bona setsebi litabeng tsa bophelo, kapa ba reka lisebelisoa tse ling tsa bophelo joaloka lintho tse tlamang mageba, sesebelisoa se nkang mocheso oa 'mele, le tse ling ntle ho bona setsebi sa tsa bophelo. Na nakong ea libeke tse 'ne tse fetileng, le ile la reka e 'ngoe ea lisebelisoa tse seng li boletsoe
 Ee Che
- 3.6 Haeba karabo ea hao ele ee ho 3.5, le ile la reka eng
- 3.7 Lisebelisoa tse ene ele bakeng sa eng

4. BOTENG BA METSI

- 4.1 Mohloli oa mantlha oa metsi a nooang ke o fe bakeng sa lelapa
 Metsi a tsamaeang ka peipi Seliba kapa metsi a cheketsoeng Seliba se chekiloeng
 Metsi a tsoang qanthaneng Metsi a pula Metsi a tlosoang ka teraka
 Metsi a tlosoang ka koloeana Metsi a tsoang letamong, nokeng Metsi a t'setsoeng ka hara botlolo kapa phuleng
- 4.2 Mohloli oa mantlha oa metsi oo lelapa la hao le o sebelisang bakeng sa ho pheha le ho hlatsoa matsoho ke o fe
 Metsi a tsamaeang ka peipi Seliba kapa metsi a cheketsoeng Seliba se chekiloeng
 Metsi a tsoanang qanthaneng Metsi a pula Metsi a tlosoang ka teraka
 Metsi a tlosoang ka koloeana Metsi a tsoang letamong, nokeng Metsi a t'setsoeng ka hara botlolo kapa phuleng
- 4.3 Mohloli oo oa metsi o fumaneha kae
 Ka hara motse Ka hara jarete Nqa e 'ngoe
- 4.4 Ho nka metsotso e mekae ho ea kha metsi, ho ea le ho khutla



4. BOTENG BA METSI [Continue]

- 4.5 Nakong ea liveke tse t'seletseng tse fetileng, na mohloli o oa metsi o ile oa hloka metsi nako e ka etsang letsatsi
 Ee Che
- 4.6 Na ho na le seo u se etsang hore metsi a bolokehe bakeng sa ho noa
 Ee Che
- 4.7 Haeba karabo ea hao ke ee ho 4.6, u tloetse ho etsa eng hore metsi a bolokehe bakeng sa ho noa

5. BOTENG BA NTLOANA

- 5.1 Ke mofuta ofeng oa ntloana oo lelapa la hao le o sebelisang
 Ntloana e sebelisang metsi ho tsoa ka peipi Ntloana e sebetsang ka metsi ho ea sekoting se tla huloa ha se tletse Ntloana e sebelisang metsi ho ea sekoting sa ntloana e chekeloang
 Ntloana e sebelisang metsi ho ea sebakeng se seng Ntloana e sebelisang metsi ho ea moo ke sa tsebeng Ntloana e ka sebelisoang bakeng sa monontsa
 Ho sebelisa pitsana Ntloana e sa haelloang fat'se Matlapeng, morung
 Ntloana ea mokoti Mofuta o mong oa ntloana
- 5.2 Na le sebelisa ntloana ee le malapa a mang
 Ee Che
- 5.3 Haeba karabo ea hao ke ee ho potso ea 5.2, le sebelisa ntloana le malapa a makae ho kenyeletsa lelapa la hau

- 5.4 Ntloana e e sebakeng sefeng

6. TSELA EA HO LOKISA LIJO LE NTLO

- 6.1 Lelapa la hau le sebelisa matla a mofuta ofeng bakeng sa ho pheha
 Khase e ka meqomong Khase ea tlhaho Khase e fehloang ho tsoa likhoerekhoereng
 Parafini Mashala a maholo Mashala a manyane
 Patsi Litlhaka/joang Motlakase
 Lijalo Lisu
- 6.2 Na le phehela ka tlung, kapa sebakeng se fapaneng, kapa kantle
 Ha re phehele ka tlung Re phehela ka tlung Re phehela mohahong o fapaneng
 Re phehela kantle
- 6.3 Na le na le phaposi e khethehileng bakeng sa ho pheha
 Ee Che

Na lelapa la hao le na le tse latelang

	Ee	Che
6.4 Seea-le-moea	<input type="checkbox"/>	<input type="checkbox"/>
6.5 Seea-le-moea pono	<input type="checkbox"/>	<input type="checkbox"/>
6.6 Mohala oa fat'se	<input type="checkbox"/>	<input type="checkbox"/>
6.7 Komporo	<input type="checkbox"/>	<input type="checkbox"/>
6.8 Sehatsetsi	<input type="checkbox"/>	<input type="checkbox"/>
6.9 Ho ea ka maikutlo a hau, seo u ka reng ke bophelo ba boleng ke se fe		



7. KANETSO EA LIJO

	Ee	Che
7.1 Na u kile oa khathatseha hore lelapa la hao le ka sebe le lijo tse lekaneng	<input type="checkbox"/>	<input type="checkbox"/>
7.2 Na uena kapa e mong oa lelapa, le ile a sitoa ho ja lijo tseo le li thabelang ka lebaka la ho hloka hahala ha chelete	<input type="checkbox"/>	<input type="checkbox"/>
7.3 Na uena kapa e mong oa lelapa la hau le jele mofuta e fokolang ea lijo matsatsing a latellanang ka lebaka la ho hloka chelete	<input type="checkbox"/>	<input type="checkbox"/>
7.4 Na uena kapa e mong oa lelapa le jele lijo tseo le sa li thabelang ka lebaka la ho hloka chelete	<input type="checkbox"/>	<input type="checkbox"/>
7.5 Na uena kapa e mong oa lelapa le jele lijo tse nyane kapa tse sa khoriseng hobane lijo li sa lekane	<input type="checkbox"/>	<input type="checkbox"/>
7.6 Na uena kapa e mong oa lelapa le jele ka makhetho a fokolang hobane lijo li sa lekane	<input type="checkbox"/>	<input type="checkbox"/>
7.7 Na le ile la hloka lijo hohang ka lebaka la bohloki ba chelete bakeng sa ho reka lijo	<input type="checkbox"/>	<input type="checkbox"/>
7.8 Na uena kapa e mong oa lelapa le ile la robala le sa ja ka lebaka la hobane lijo li le sieo	<input type="checkbox"/>	<input type="checkbox"/>
7.9 Na uena kapa e mong oa lelapa le ile la nka letsatsi kaofela le sa je ka lebaka la ho hloka lijo	<input type="checkbox"/>	<input type="checkbox"/>

Nakong ea likhoeli tse leshome le metso e 'meli tse fetileng, na le bile le bohloki ba chelete ho fihlela boemong boo le senang lijo?

A ko kale likhoeli ho tloha ho 1 (Ha hole hobe haholo – chelete le lijo li sokoleha) ho isa ho 10 (Ha ho hlamatseha – ha chelete le lijo li ne li sa sokolehe)

	1	2	3	4	5	6	7	8	9	10
7.10 Pherekhong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.11 Hlakola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.12 Tlhakubele	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.13 'Mesa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.14 Mot'seanong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.15 Phuptjane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.16 Phupu	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.17 Phato	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.18 Loetse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.19 Mphalane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.20 Pulungoana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.21 T'sitoe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.22 Ha lijo li sa lekane litho tsa lelapa kaofela, ke litho li feng tse sekisetsoang	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Bana ba ka tlase ho lilemo tse hlano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Bana ba lipakeng tsa lilemo tse hlano le tse leshome le metso e robeli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Batho ba baholo ba batona, ba ka holimo ho lilemo tse leshome le metso e robeli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Batho ba baholo ba bat'sehali, ba ka holimo ho leshome le metso e robeli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



7. KANETSO EA LIJO [Continue]

7.23 Letsatsing la maobane, batho ba baholo ba lelapa ba jele makhethlo a makae

7.24 Letsatsing la maobane, bana ba lilemo tse lipakeng tsa tse tharo le tse t'seletseng ba jele makhethlo a makae

T'SEBELISO EA LIJO

Poone

7.25 Na uena kapa e mong oa lelapa le ile la ja poone kapa lihlahisoa tsa poone letsatsing la maobane

Ee Che

7.26 U jele poone kapa lihlahisoa tsa poone khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.27 Lihlahisoa tsa poone u li fumana hokae

Ke li reka lebenkeleng Kea itemela Baamani 'moho le nna
 Ho mohiri Bahaisane / lihoai tse ling

7.28 Lit'senyehelo tsa hao holima lihlahisoa tsa poone ke bokae ka khoeli

Lijo - thollo (koro, mabele, lijo – thollo tsa hoseng)

7.29 Na uena kapa e mong oa lelapa le jele lijo-thollo tse ling letsatsing la maobane

Ee Che

7.30 U jele lijo-thollo tse ling khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.31 Lihlahisoa tsa lijo-thollo tse ling u li fumana hokae

Ke li reka lebenkeleng Kea itemela Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.32 Lit'senyehelo tsa hao holima lijo-thollo tse ling ke bokae ka khoeli

Litsoa-mobung (litapole, lihoete le lijo tse entsoeng ka litsoa mobung)

7.33 Na uena kapa e mong oa lelapa le jele litsoa-mobung letsatsing la maobane

Ee Che

7.34 U jele litsoa-mobung khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka nako e nngoe
 Khafetsa Khafetsa khafetsa

7.35 Litsoa-mobung u li fumana hokae

Ke li reka lebenkeleng Kea itemela Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.36 Litsenyehelo tsa hao holima litsoa-mobung ke bokae ka khoeli

Litholoana le meroho

7.37 Na uena kapa e mong oa lelapa le ile la ja litholoana le meroho tse nonneng ka matsoai letsatsing la maobane

Ee Che

7.38 U jele litholoana le meroho tse nonneng ka matsoai khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa



7. KANETSO EA LIJO [Continue]

7.39 Litholoana le meroho tse nonneng ka matsoai u li fumana hokae

- Ke li reka lebenkeleng Kea itemela Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.40 Lit'senyehelo tsa hao lijong tse nonneng ka matsoai ke bokae ka khoeli



Nama e khubelu: Khomo, nku, poli le likahare li le ling kapa ele karolo ea sechu.

7.41 Na uena kapa e mong oa lelapa le jele nama e khubelu: khomo le likahare li le ling kapa ele karolo ea sechu letsatsing la maobane

- Ee Che

7.42 U jele nama e khubelu: khomo le likahare ele karolo ea sechu kapa li le ling khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.43 Nama e khubelu u e fumana hokae

- Ke e reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.44 Lit'senyehelo tsa ho reka nama e khubeli ke bokae ka khoeli



Nama e khubelu: Nyamatsana, liphoofolo tse nahana ho kenyeletsa meutloa le linonyana

7.45 Na uena kapa e mong oa lelapa le jele nama e khubelu: Nyamatsana, liphoofolo tsa naha tse kenyeletsang meutloa le linonyana letsatsing la maobane

- Ee Che


7.46 U jele nama e khubelu: Nyamatsana, liphoofolo tsa naha tse kenyeletsang meutloa le linonyana khafetsa haka matsatsing a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.47 Nama e khubelu: nyamatsana, liphoofolo tsa naha tse kenyeletsang meutloa le linonyana u e fumana hokae

- Ke e reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.48 Lit'senyehelo tsa hao ha u reka nama e khubelu: Nyamatsana, liphoofolo tsa naha tse kenyeletsang meutloa le linonyana ke bokae ka khoeli



Nama e khubelu: khomo poli, nku, kolobe le likahare ESE karolo ea sechu

7.49 Na uena kapa e mong oa lelapa le jele nama e khubelu: khomo, poli, kolobe le likahare ese karolo ea sechu letsatsing la maobane

- Ee Che

7.50 U jele nama e khubelu: khomo poli, kolobe le likahare ese karolo ea sechu khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

Likhoho: khoho le likahare (likitsana le maotoana)

7.51 Na uena kapa e mong oa lelapa le jele likhoho le likahare letsatsing la maobane

- Ee Che

7.52 U jele likhoho le likahare khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa



7. KANETSO EA LIJO [Continue]

7.53 Lihlahisoa tsa likhoho le likahare u li fumana hokae

- Ke li reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.54 Lit'senyehelo tsa ho reka likhoho le likahare ke bokae ka khoeli

Linama tse ling: linama tse ka makotikoting, palone

7.55 Na uena kapa e mong oa lelapa le jele linama tse ling letsatsing la maobane

- Ee Che

7.56 U jele linama tse ling khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.57 Lihlahisoa tsa linama tse ling u li fumana hokae

- Ke li reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.58 Lit'senyehelo tsa ho reka linama tse ling ke bokae ka khoeli

Tlhapi (foreshe): e makotikoting le e hatselitsoeng

7.59 Na uena kapa e mong oa lelapa le jele a tlhapi e foreshe, e makotikoting kapa e hatselitsoeng letsatsing la maobane

- Ee Che

7.60 U jele tlhapi e foreshe, e makotikoting kapa e hatselitsoeng khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.61 Lihlahisoa tsa tlhapi e foreshe, e makotikoting, kapa e hatselitsoeng u li fumana hokae

- Ke li reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.62 Lit'senyehelo tsa ho reka tlhapi e foreshe, e makotikoting kapa e hatselitsoeng ke bokae ka khoeli

Mahe

7.63 Na uena kapa e mong oa lelapa le jele mahe letsatsing la maobane

- Ee Che

7.64 U jele mahe khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

7.65 Mahe u a fumana hokae

- Ke reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

7.66 Lit'senyehelo tsa ho reka mahe ke bokae ka khoeli

Linaoa, lierekisi, makotomane, lithotse: (linaoa tse ka lekotikoting, makotomane, lithotse tsa sonobolomo, lithotse tsa mokopu)

7.67 Na uena kapa e mong oa lelapa le jele linaoa, lierekisi, makotomane le lithotse letsatsing la maobane

- Ee Che

7.68 U jele linaoa, lierekisi, makotomane le lithotse khafetsa haka nakong ea matsatsi a supileng a fetileng

- Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa



7. KANETSO EA LIJO [Continue]

- 7.69 Linaoa, lierekisi, makotomane le lithotse u li fumana hokae
 Ke reka lebenkeleng Kea itlhahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

- 7.70 Lit'senyehelo tsa ho reka linaoa, lierekisi, makotomane le lithotse ke bokae ka khoeli

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Lihlahisoa tsa lebese (mafi, lebese, lebese le phofo)

- 7.71 Na uena kapa e mong oa lelapa le jele lihlahisoa tsa lebese letsatsing la maobane

Ee Che

- 7.72 U jele lihlahisoa tsa lebetse khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

- 7.73 Lihlahisoa tsa lebese u li fumana hokae

Ke reka lebenkeleng Kea itlhahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

- 7.74 Lit'senyehelo tsa lihlahisoa tsa lebese ke bokae ka khoeli

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Lirole: (ole, mafura, botoro)

- 7.75 Na uena kapa e mong oa lelapa le jele lirole le mafura letsatsing la maobane

Ee Che

- 7.76 U jele mafura le lirole khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

- 7.77 Mafura le lirole u li fumana hokae

Ke reka lebenkeleng Kea itlhahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

- 7.78 Lit'senyehelo tsa ho reka lirole le mafura le bokae ka khoeli

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Litsoekere: (Nyoponyopo, tsoekere, lipompong, makheha & maphoqo)

- 7.79 Na uena kapa e mong oa lelapa le jele litsoekere letsatsing la maobane

Ee Che

- 7.80 U jele litsoekere khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa

- 7.81 Litsoekere u li fumana hokae

Ke reka lebenkeleng Kea itlhahisetsa Baamani 'moho le nna
 Mohiri Bahaisane / lihoai tse ling

- 7.82 Lit'senyehelo tsa ho reka litsoekere ke bokae ka khoeli

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Lino: (kofi, tee, tai, lero la litholana)

- 7.83 Na uena kapa e mong oa lelapa le sebelisitse lino letsatsing la maobane

Ee Che

- 7.84 U sebelisitse lino khafetsa hakae nakong ea matsatsi a supileng a fetileng

Hanyane haholo Hanyane Ka linako tse ling
 Khafetsa Khafetsa khafetsa



7. KANETSO EA LIJO [Continue]

7.85 Lino u li fumana hokae

 Ke reka lebenkeleng Kea ithahisetsa Baamani 'moho le nna Mohiri Bahaisane / lihoai tse ling

7.86 Lit'senyehelo tsa ho reka lino ke bokae ka khoeli

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8. TEMO EA KHOAEANE

8.1 Ke lintho li feng tse susumelitseng hore u amohele khoeane ele mofuta oa lijo

Kea leboha ka nako ea hao!!!

ANNEXURE E: CONSENT LETTER



Department Consumer Science

Tel: 051 401 2572

Fax: 051 401 9995/ 0866 934 974

Dear participant

This serves to inform you that **Miss Nthabeleng Nkoko**, is a MSc Consumer Science student at the University of the Free State. She is conducting research on oyster mushroom production in Maseru. The topic aims to determine the influence of the oyster mushroom project on the food security and quality of life of the involved households. The households that are involved in the project and those that are not involved will be asked to provide information to enable assessment of the impact. We therefore rely on your support to complete this questionnaire.

Please answer the questionnaire with honesty, your anonymity and confidentiality will be respected. The questionnaire will not take more than 40 minutes to complete. Your participation is voluntary and will be appreciated.

Thank you for your co-operation. For more information concerning the questionnaire, please contact one of the following people:

Nthabeleng Nkoko

Researcher

nthabelengnkoko@gmail.com

Dr N Cronjé

Supervisor

cronjen@ufs.ac.za

Prof H Steyn

Supervisor

steynhj@ufs.ac.za



ANNEXURE F: CONSENT LETTER (TRANSLATED)

Department Consumer Science

Tel: 051 401 2572

Fax: 051 401 9995/ 0866 934 974

Ho motho eatla nka karolo, ea ratehang

Ka lengolo lena u tsebisoa hore **Mofumahali Nthabeleng Nkoko** ke moithuti ea etsang lengolo le phahameng latsa Mahlale a Boji sekolong se phahameng sa lithuto sa Junifesithi ea Freistata. Mofumahali Nkoko o ntse a etsa lipatlisiso ho tsa tlhahiso ea khoeane sebakeng sa Maseru. Lipatlisiso tsena li shebana le hore na tlhahiso ea khoeane e bapala karolo efe kanetsong ea lijo le bophelong bo botle malapeng a hlahisang khoeane. Malapa a hlahisang khoeane le malapa asa hlahiseng khoeane a kopuo a mona ho fana ka leseli letla etsa hore boithuto bona bo phethahale. Re kopa tsehetso ea hau ka hore u arabele lipotso tseo u tlang ho li botsa.

Re kopa u arabele lipotso tsohle ka bot'sepehi, litaba tsa hau le mabitso a hau litla bolokoa ele sephiri. Lipotso tsena ha lina ho nka nako e fetang metsotso e mashome a mane. Ha u oa qobelloa ho nka karolo boithutong bona empa reka thabela ha u ka etsa joalo.

Re leboha tsebelisano 'moho ea hau. Haeba u na le seo u batlang hose tseba ho feta mona ka lipotso tsena, u ka buisana le batho ba latelang:

<hr/>	<hr/>	<hr/>
Nthabeleng Nkoko	Dr N Cronjé	Prof H Steyn
Mofuputsi	Mosupisi	Mosupisi
nthabelengnkoko@gmail.com	cronjen@ufs.ac.za	steynhj@ufs.ac.za

