



**FIT FOR PURPOSE? THE STRENGTHS AND WEAKNESSES OF GAUTENG
MATERNITY SERVICES HEALTH CARE ORGANISATION / CONFIGURATION
IN THE CONTEXT OF REDUCING MATERNAL DEATHS**

by

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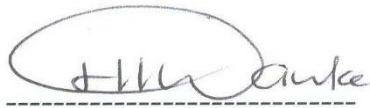
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DEDICATION

This thesis is dedicated to my wife (Confidence), my children (Watshembeka and Utshembekile), my siblings (Emelinah (late), Sannie, Sarah, Sophy, Salphina and Brenda), my late parents (Yingwani John and Tsatsawane Luceth Chauke) and all my nephews and nieces. I hope this work makes you proud and inspires you to dream big!

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LIST OF ABBREVIATIONS

ANC	African National Congress
ART	Antiretroviral treatment
BGH	Bertha Gxowa Hospital
BJOG	British Journal of Obstetrics and Gynaecology
CEO	Chief Executive Officer
CH	Carletonville Hospital
CHBAH	Chris Hani Baragwanath Academic Hospital
CHC	Community health centre
CHW	Community healthcare worker
CIPP	Context, Input, Process, Product
CMJAH	Charlotte Maxeke Johannesburg Academic Hospital
COE	City of Ekurhuleni
COJ	City of Johannesburg
COT	City of Tshwane
CPF	Cluster Policy Framework
CRP	Cluster Referral Policy
CSP	Comprehensive Service Plan
CTG	Cardiotocography
CTOP	Choice of termination of pregnancy
DCST	District clinical specialist team

DGMAH	Dr George Mukhari Academic Hospital
DHIS	District Health Information System
DID	Department of Infrastructure and Development
DH	District hospital
DHS	District healthcare services
DHS-PHC	Primary healthcare orientated District Health Care services
DOH	Department of Health (national)
EDOH	Eastern Cape Department of Health
EH	Edenvale Hospital
ESMOE	Essential steps in the management of obstetrics emergencies
FERH	Far East Rand Hospital
GDID	Gauteng Department of Infrastructure Development
GDOH	Gauteng Department of Health
GEMS	Gauteng Emergency Medical Services
GP	Gauteng Province
GPREC	Gauteng Province Research Ethics Committee
GNU	Government of National Unity
HELLP	Haemolysis, elevated liver enzymes and low platelets
HIT	Health Information Technology
HJPTH	Helen Joseph Provincial Tertiary Hospital

HISPU	Health Intelligence and Planning Unit
HIV	Human Immunodeficiency Virus
HOD	Head of department
HPT	Hypertension
HPTG	Health Professions Training Grant
HQHS	High quality health systems
HREC	Human Research Ethics Committee
ICESCR	International Covenant on Economics, Social and Cultural Rights
ICU	Intensive Care Unit
iMMR	Institutional mortality rate. This used to indicate health facility deliveries deaths where community deliveries and death are unavailable
Km	Kilometres
LH	Leratong Hospital
LMIC	Low and middle-income countries
Min.	Minutes
MDG	Millennium Development Goal
MMR	Mixed method research
MNCH	Maternal, neonatal and child health
MOU	Midwife Obstetric Unit
M&M	Maternal morbidity and mortality
M&S	Medical and surgical
NCCEMD	National Committee on Confidential Enquiry into Maternal Deaths

NDOH	National Department of Health
NGO	Non-governmental organisation
NHA	National Health Act (NHA) No. 61 of 2003
NHI	National health insurance
NPRI	Non-pregnancy related infections
NTSG	National Tertiary Services Grant
OAU	Organisation of African Union
OCC	Obstetric critical care
OH	Obstetric haemorrhage
OHS	Office of Healthcare Standards
OHSC	Office of Healthcare Standard Compliance
OMs	Operational Managers
OMBU	Midwife Obstetric Unit
PDOH	Provincial Department of Health
PE	Pulmonary embolism
PH	Pholosong Hospital
PHC	Primary healthcare
PRS	Pregnancy related sepsis
PTH	Provincial tertiary hospital
QiP	Quality Improvement Program
RDP	Reconstruction and Development Program

RMMCH	Rahima Moosa Mother and Child Hospital
SADC	Southern African Development Community
SDG	Sustainable Development Goal
SAHRC	South African Human Right Commission
SRH	South Rand Hospital
Stats SA	Statistics South Africa
STIs	Sexually transmitted infection
TB	Tuberculosis
TMH	Tambo Memorial Hospital
TOP	Termination of pregnancy
UDHR	Universal Declaration of Human Rights
UHC	Universal Healthcare Coverage
UN	United Nations
UNICEF	United Nations Children's Fund
WBOT	Ward-Based Outreach Team
WDOH	Western Cape Department of Health
WD	West Rand district
WHO	World Health Organization
YDH	Dr Yusuf Dadoo Hospital
KZN	KwaZulu-Natal

ABSTRACT

BACKGROUND: Despite the availability of evidence-based and cost-effective interventions that are accessible to low and middle-income countries (LMICs), women continue to die of preventable pregnancy-related causes worldwide. Sub-Saharan Africa (SSA) carries a disproportionate burden of maternal mortality (68% of the global burden) relative to its size (has just below 16% of the world's total population). The high burden of maternal deaths in SSA, including other LMICs, has been attributed to the failure of its healthcare system, in particular, poor quality of primary healthcare (PHC) orientated district healthcare services (DHS). The DHS-PHC model is the statutory model for service delivery in South Africa.

This model has been blamed in studies conducted in low-and middle-income countries (LMICs) for the poor quality of both maternal and general healthcare services. Consequently, calls for the centralisation of maternity services to hospitals have started to emerge, the argument in favour of such a move is that centralising maternity services to hospitals would improve pregnant women's access to emergency maternity healthcare services and skilled attendants in a timely manner. Others have however argued that a hospital-based model of maternity care is both costly and unsustainable for countries with limited resources and instead this group have called for the strengthening of the DHS-PHC. Informed by contextual realities, various African countries, as well as provinces in South Africa implemented different strategies aimed at strengthening the DHS-PHC model. For example, in the Western Cape and Gauteng, this took the form of a Comprehensive Service Plan (CSP) and Cluster Policy Framework (CPF). The two healthcare frameworks are based on a regional model but differ in philosophy and governance structures. Both models aim to strengthen the district health care system, improve health service efficiency as well as quality of care. Although only signed into policy in January 2019, the CPF model has been in operation in the Charlotte Maxeke Johannesburg Academic Hospital Cluster (CMJAH) since 2016, mainly in the Obstetrics and Gynaecology and Surgical disciplines. Unlike the Western Cape's CSP model, the Gauteng CPF healthcare model has not been subjected to scientific evaluation since its implementation. Because maternal and neonatal healthcare services are national and provincial priority areas, maternity healthcare services

presented a unique opportunity to evaluate the CPF, a healthcare innovation aimed at improving the quality and governance of healthcare services.

AIM: The aim of the study was to assess the strengths and weaknesses of the organization/ configuration of maternity healthcare services in Gauteng, in particular, the CPF as implemented in the CMJAH maternity cluster in order to identify gaps/healthcare barriers and use this information to recommend healthcare services improvement strategies.

METHODOLOGY: Informed by Stufflebeam's Context, Input, Process and Product (CIPP) theoretical model /framework, and a convergent mixed method research design, quantitative and qualitative data were simultaneously and independently collected, analysed, results synthesized and merged through a process of triangulation. The quantitative component involved an audit of maternity healthcare facilities in terms of resources (number of facilities, distribution, bed capacity, human resource), service load (deliveries) and maternal deaths. Semi-structured interviews with frontline healthcare workers and their immediate supervisors/managers, facility visits and the review of the cluster morbidity and mortality (M&M) meetings minutes, as well as the Cluster Policy Framework (CPF), constituted the qualitative component.

RESULTS: The CPF managed to establish clinical governance, standardised protocol, improved coordination of healthcare services, including creating an enabling environment for support, collaboration and sharing of knowledge and skills among healthcare workers from different levels of care and healthcare. During the period under study, the cluster saw a modest and sustained decline in maternal mortality despite an increase in maternity deliveries. However, the CPF faced challenges in the form of a mismatch between the demand and supply side of healthcare services. The mismatch was due to a number of factors, among those, poor leadership, management, governance, infective implementation of the CPF and a high rate of provincial and international migration. Together with leadership and management challenges, the mismatch between the demand and supply side of healthcare services, resulted in the over burdening of maternity healthcare services, increase in patient adverse events, disgruntled healthcare workers, poor quality of care and

an increase in medico-legal challenges thereby setting on the stage, a vicious cycle with no end point.

CONCLUSION: Gauteng CPF is an excellent example of health system innovation with a potential to strengthen the quality and coordination of not only maternity but healthcare services in general. The model retains all the advantages of the DHS-PHC model and at the same time, focus on improving clinical governance, distribution and sharing of scarce resources. Poor leadership, governance, management lack of effective policy implementation, inadequate infrastructure, shortage and ineffective management of human resources, among other factors, have created bottlenecks and challenges in the health system, limiting the CPF model's potential. These challenges would need to be addressed in order for the CPF to deliver on its promise. Failure to do so could result in a catastrophic failure of the much-awaited NHI.

KEYWORDS: cluster, configuration, district, deaths, healthcare, maternal, maternity, primary, organization, services.

CHAPTER 1: BACKGROUND AND ORIENTATION TO THE THESIS

1.1 Introduction

The purpose of this chapter is to introduce the reader to the study. The chapter, therefore, presents the background to the study, problem statement, motivation for the study, hypothesis, research questions, aims, objectives, and conceptual framework. This chapter ends with an outline of the rest of the research report.

1.2 Background to the study

Despite the availability of evidence-based and cost-effective interventions accessible to low and middle-income countries (LMICs), around 810 women continue to die as a result of preventable pregnancy-related conditions on daily basis (WHO, 2019a). Furthermore, majority of the maternal deaths (94%) occur in LMICs, with Sub-Saharan Africa (SSA) and Asia bearing 86% of the total global burden (WHO, 2019a). Even more concerning is the disproportionate burden of maternal deaths that occur in SSA. This region alone, carries 68% of the global burden (Pletcher, 2020). This is despite the fact that it is home to only 15.7% of the world's total population (Pletcher, 2020). Maternal deaths are just a tip of the iceberg because for every mother who dies, 20 to 30 more women survive but with long-term consequences and suffering (Firoz et al., 2013). Majority of the deaths and disabilities could have been prevented by improving the organisation, functioning, governance and quality of maternity healthcare services (Kaseje, 2006; Kruk et al., 2018).

While there are other factors, evidence suggests that a greater proportion of maternal deaths in LMICs are a result of health system failure, in particular, failure of the primary healthcare (PHC) and district health care services (DHS) model (Campbell, 2016; Kruk et al., 2018; Roder-DeWan, 2020). Consequently, calls are being made to replace the PHC-DHS model with hospital based maternity services (Black et al, 2010; Gage et al., 2019; Kruk et al., 2018). The health system of many LMICs is based on the DHS-PHC or other forms of regionalised healthcare services however evidence suggests that these models in LMICs are not responsive to local healthcare needs and challenges, hence the

reported unequal access to life saving interventions and poor quality of care (Campbell, 2016; Kruk et al., 2018; Roder-DeWan, 2020).

The above has led to different opinions on how to best respond to the situation. One suggestion is to move maternity services to hospitals while strengthening and supporting primary healthcare facilities to provide quality antenatal care (Kruk et al., 2018). This view also shared by Gage et al. (2019). The authors modelled the feasibility of centralizing deliveries to hospitals in Haiti, Kenya, Malawi, Namibia, Nepal and Tanzania and concluded that moving maternity deliveries to hospitals would be better than attempting to improve the quality of healthcare in PHC facilities. The study reported that that moving maternity deliveries to hospitals did not affect women's access to maternity healthcare services.

As study by Hemmiki et al. (2011) found that moving deliveries to hospitals did not offer any additional advantages in countries where maternity services are organised along a regional model supported by functional referral systems. The contrasting findings between the two studies is perhaps best explained by Chimezie (2015). Chimezie argues that the reason for PHC failure in Africa lies in the design of Africa's health systems, majority of which have been adopted from Western countries and ignored local conditions. According to the author, these models are out of tune with local needs.

Roger-DeWan et al. (2020) locates the problem to the underlying assumption of the PHC-DHS model that majority of the pregnant women are low risk. Women are therefore managed in primary healthcare clinics and only referred to a higher level of care if they have risk factors. This view seems to ignore the fact that pregnancy-related complications are unpredictable and can occur in women with no risk factors. Some studies estimate that between 15-30% of women considered to be low risk will develop complications during their pregnancies that will require referral to a higher level of care (Danilack et al., 2015, Pattinson, 2015). Others suggest that up to 80% of pregnant women will require referral to a hospital during the course of the pregnancy for various reasons (DOH, 2015a). The above suggests the DHS-PHC model require a functional hospital referral network for the model to work. Despite the above Hanson and Schellenberg (2019)

caution against the haste to discard the DHS-PHC in favour of a hospital-based model as suggested by other researchers (Gage et al. 2019; Kruk et al., 2019). The authors recommend that countries should rather focus on designing context-specific solutions and subject those to research scrutiny to assess their efficacy, safety and ability to provide access to safe and quality healthcare (Hanson and Schellenberg, 2019). Among many possible solutions, one possible approach would be for countries to focus on strengthening the DHS-PHC model. This can be achieved through the injection of much needed resources and strengthening of healthcare leadership and governance (Chauhan and Willis, 2014; Ergo et al., 2011; Hemmiki et al., 2011; Hanson and Schellenberg, 2019; Kung'u et al. 2018; Parkhurst et al., 2005; Zeng et al., 2018).

Similar challenges have been reported with DHS-PHC model in South Africa and among the top on the list, lack of policy implementation, poor management, leadership, questionable quality of care, lack of resources, dysfunctional emergency transport and referral systems (Dookie and Singh, 2012; Kredo et al., 2020). Given different views as to regarding the best healthcare model to reduce the scourge of maternal deaths in LMICs, the solution to improve maternal healthcare services and reduce maternal mortality lies somewhere in the continuum between improving the DHS-PHC model on one end to centralising maternity services to hospitals on the other. The above created a platform for healthcare innovation and sharing of country level experience among LMICs countries, more especially Africa given its high burden of diseases and maternal deaths.

1.3 Problem statement

The Gauteng Department of Health (GDOH) Cluster Policy Framework (CPF), like the Western Cape Comprehensive Service Plan (CSP) is based on a regional model of care, was introduced in 2016 to strengthen healthcare services in the province (Appendix V). Both the CPF and CSP are examples of healthcare innovations directed whose aim is to respond to contextual healthcare needs and reality. The two models are examples of the context-specific solution for maternity healthcare services suggested by Hanson and Schellenberg (2019). What is attractive about the CPF is that it seeks to strengthen healthcare services while retaining the DHS-PHC which has benefits for South Africa an

LMIC (GDOH, 2019a). The PHC-DHS model is the official and legally recognised vehicle for healthcare service delivery in South Africa (RSA, 2004).

While only signed into policy in 2019, the CPF has been in operation in the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) cluster since 2016. Since its inception, no scientific evaluation has thoroughly explored the CPF. This situation has created a knowledge gap, which this study hopes to address. Secondly, the study is consistent with Hanson and Schellenberg's (Hanson and Schellenberg, 2019) recommendations which not only called for context-specific solutions, but also recommended that such solutions be subjected to scientific scrutiny to assess their worth. It is therefore hoped that the findings from this study will assist policy makers and other stakeholders with information regarding the appropriateness or fit for purpose of the CPF, its strengths, weaknesses, existing gaps, and areas that need improvement or review. Furthermore, the results of the study could assist the rest of South Africa and other countries round the globe facing challenges that require context specific solutions. Lastly, the study adds to the literature on health systems reforms and strengthening by sharing experience from a healthcare system innovation from the perspective of a developing country.

1.4 Hypothesis

Gauteng Department of Health's Cluster Policy Framework is a healthcare innovation with a potential to improve the functioning, safety, governance and quality of maternity healthcare services, which will in turn translate into a sustained reduction in maternal mortality and improve the quality of maternity healthcare services in the province.

1.5 Research questions

The following were the research questions for the study:

- Is the Gauteng CPF fit for purpose and contextually appropriate to respond to maternity healthcare needs, challenges, causes and contributing factors of preventable maternal deaths in the province?
- Has the CPF been fully implemented?

- Has the CPF been effective in supporting maternity healthcare services and responding to the causes and contributing factors responsible for preventable maternal deaths?

1.6 Aim and objectives

1.6.1 Aim

The aim of the study was to assess the strengths and weaknesses of the organization/configuration of maternity healthcare services in Gauteng, in particular, the CPF as implemented in the CMJAH maternity cluster in order to identify gaps/healthcare barriers and use this information to recommend healthcare services improvement strategies.

1.6.2 Objectives

Using the Context, Input, Process, Product (CIPP) model and the CMJAH cluster as a case study, the specific objectives of the study were:

- To describe the organization/configuration of maternity healthcare services in Gauteng and impact of the provision of maternity healthcare services and maternal deaths.
- To explore and describe health care system barriers and enablers in the provision of maternity healthcare in Gauteng.
- To explore and describe the experiences and perceptions of frontline healthcare workers and their immediate supervisors/managers regarding the functioning of maternity healthcare services in the province.
- To use the study's findings to gain insight into challenges facing healthcare services in the province.
- To use the study's findings to recommend maternity healthcare and general healthcare services improvement strategies.

1.7 Conceptual/ Theoretical Framework

Like other sectors of society, healthcare needs to adapt to an ever-changing and complex healthcare environment. Part of this adaptation requires evaluation of healthcare services and related programs. Outcomes from program evaluation can be used to inform relevant stakeholders regarding the program's performance, its successes, barriers as well as

unintended consequences. This information could be used to improve the program's performance and also to seek context-specific solutions. This study utilized Daniel Stufflebeam's CIPP evaluation framework/model (Stufflebeam, 2003). The place of CIPP model in program evaluation has long been established. Stufflebeam's model has been used to evaluate educational programs, health services and many programs in different disciplines and settings over many years (Stufflebeam, 2003). The framework is comprehensive in its approach, factors both the needs, inputs, processes, and outcomes of projects, educational or healthcare programs.

Furthermore, the model has been used by policy makers, physicians, program directors and other stakeholders interested in program and service improvement (Stufflebeam, 2003). The main focus of the CIPP program evaluation model is on program/ service improvement. The CIPP model is made up of four components with each component dedicate to specific area of program or service evaluation (Figure 1.1.) Depending on the research question and research objectives, the four components can be used individually or in combination.

Because of the complexity of the research question, this study utilised all four components of the CIPP model. The four components are elaborated below:

- Context

The purpose of context evaluation is to identify unmet needs, existing challenges, goals of the program and determine whether there is alignment between the program design, existing needs, and challenges.

- Input

The focus of input is to evaluate the appropriateness and adequacy of investment into the program, in this context, healthcare resources.

- Process

The purpose of process evaluation is to assess how a given program is being implemented, facilitated, managed and governed. Process evaluation assists in identifying operational deficiencies, barriers or omissions. The goal is to provide

feedback to key stakeholders so that remedial action(s) can be taken to improve the program's performance.

- Product

Product evaluation focuses on the impact of the program. The focus is on how well the program/intervention is working if working at all. Product evaluation is interested on the impact of the program, existing barriers and perceptions of key stakeholders regarding the appropriateness and performance of the program. This is done to provide program directors and managers with feedback regarding the program's performance, achievements, failures and existing challenges.

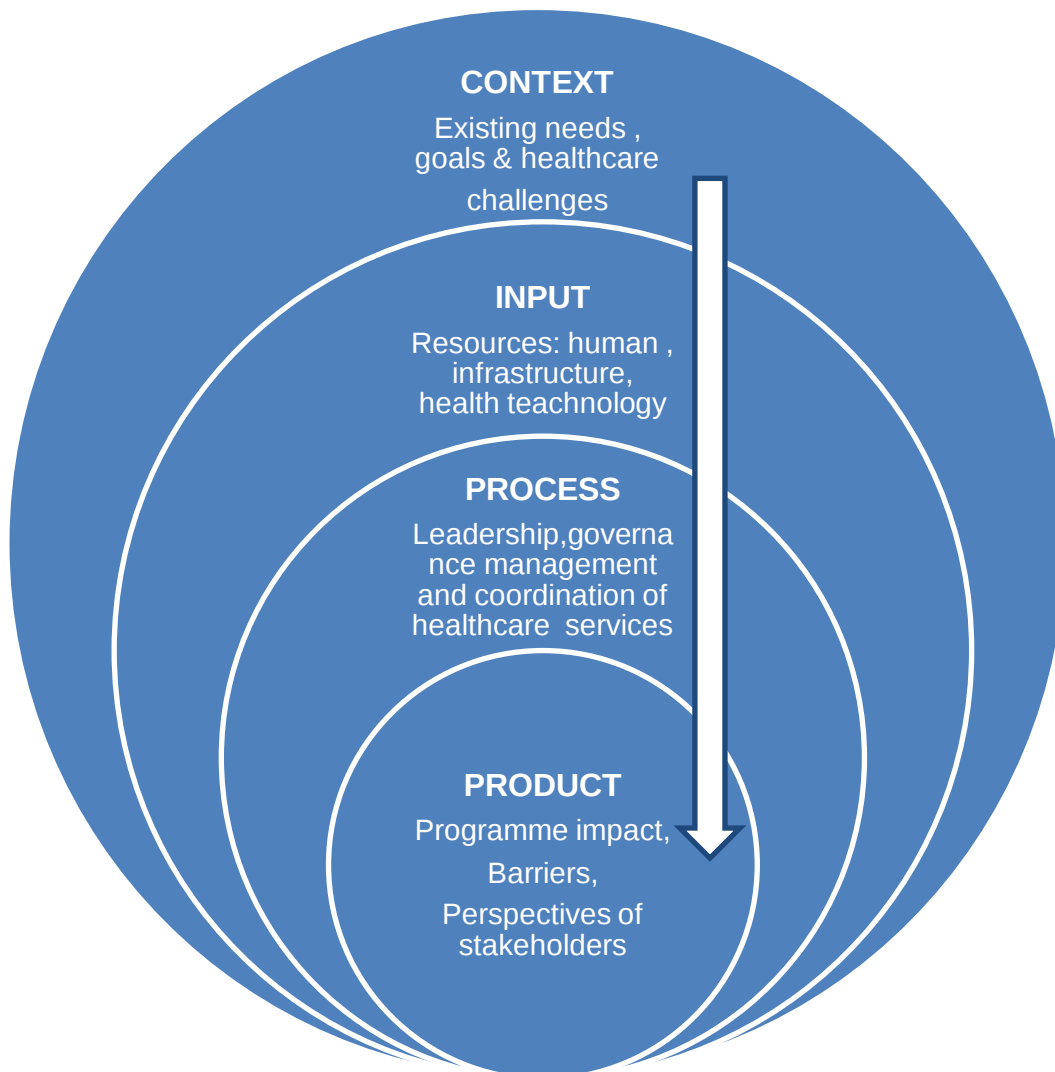


Figure 1. 1: CIPP model

1.8 Thesis outline

This research report consists of 8 chapters as follows:

Chapter 1: Background and orientation to the study - this chapter introduces the background to the study and explains the problem statement, aim and objectives of the study, and the conceptual framework.

Chapter 2: Maternal deaths - global and regional perspectives on causes and contributing factors for maternal deaths are presented in this chapter.

Chapter 3: Maternal deaths- South African perspective - provides an overview of maternal death in South Africa with a specific focus on causes and contributing factors.

Chapter 4: Research design and methodology - this chapter discusses the research design and methodology, including the rationale for the choices made.

Chapter 5: Quantitative results - presents the result of the quantitative component.

Chapter 6: Qualitative results - discusses the result of the qualitative component.

Chapter 7: Consolidated - integrates the results of the quantitative and qualitative component through synthesis and triangulation.

Chapter 8: Conclusions, recommendations, strengths and weaknesses of the study – this chapter presents the study's conclusions to the study findings. A brief discussion on the strengths and weaknesses of the study is also presented.

CHAPTER 2: MATERNAL DEATHS – GLOBAL AND REGIONAL PERSPECTIVES

2.1 Introduction

This chapter presents maternal deaths from global and regional perspectives. The focus of the chapter is on the causes, contributing factors, and impact of maternal death.

2.2 Maternal deaths – global perspectives

Maternal death is defined as the death of a woman while pregnant or within 42 days of pregnancy termination (TOP), regardless of the site or duration of the pregnancy due to conditions caused or aggravated by pregnancy, but excluding incidental causes (Ronsmans and Graham, 2006). The World Health Organisation (WHO) estimates that 295 000 women die due to pregnancy-related causes worldwide and 94% of the maternal deaths take place in LMICs (WHO et al., 2019; WHO, 2019b). In terms of absolute numbers, Sub-Saharan Africa (SSA) and Asia contribute to about 86% of the global burden of maternal deaths (Garenne, 2015; WHO et al., 2019; WHO, 2019a; WHO, 2019b). In terms of regional contribution, SSA alone contributes about 68% of the global burden (WHO et al., 2019).

A woman's life-time risk of dying during pregnancy depends on where she lives (WHO et al. 2019). The life-time risk of a woman dying in pregnancy or immediately after pregnancy is 1:/5400, 1:/240 and 1:/38 in high and middle-and-low-income countries (HICs and LMICs) and SSA respectively (WHO et al., 2019). When broken down into regions, the picture is sobering (Table 2.1). A woman's chance of dying due to pregnancy-related causes is highest in West and Central Africa, followed by regions within SSA. Compared to the rest of the world women residing in Western Europe have the lowest risks of dying due to pregnancy-related causes. Majority of deaths (85%) occur during delivery and post-partum and are potentially preventable (Li et al., 1996; Paxton et al., 2005; Sumankuuro et al., 2018).

Table 2. 1: Regional variation in a woman's life-time risk of maternal death

REGION	LIFE-TIME RISK OF MATERNAL DEATH
West and Central Africa	1:28
Regions within Sub-Saharan Africa	1:38
Eastern and Southern Africa	1:58
Southern Asia	1:240
Middle East and North Africa	1:570
Latin America and Caribbean	1:630
East Asia and Pacific	1:790
Eastern Europe and Central Asia	1:2600
North America	1:4300
Western Europe	1:11900

Source: WHO et al. (2019)

Maternal deaths dropped by 38% between 2000 and 2017 globally (WHO et al., 2019). This translates into an annual reduction of 2.3%, which is far from an annual reduction of 6.4% required to achieve the United Nations' Sustainable Developmental Goal (SDG) which commit countries around the world to reduce their maternal mortality ratio to less than 70 000 per 100 000 livebirths by the year 2030 (WHO 2016b; WHO, 2019b; WHO et al., 2019; UN, 2015a). The performance of two continents, South Asia and SSA is worse when compared to the rest of the continents (WHO et al., 2019). Similarly, SSA's performance is worse when compared to that of South Asia. This is because South Asia achieved a 59% reduction in maternal mortality ratio 2000-2017 (WHO et al. 2019a). The corresponding figure for SSA was 39% for the same period (WHO et al., 2019a). SSA, needs to scale up its efforts to achieve the United Nations 2030 SDGs. According to research, difficulties in accessing healthcare services and poor quality of care are among the key factors that are responsible for the less-than-optimal reduction in maternal mortality in LMICs (Koblinsky, 2016). These factors reflect healthcare systems' poor performance and therefore behind the growing calls for acceleration in health system research in LMICs (Cherish and Martin, 2017).

2.3 Causes of maternal deaths

The causes of maternal deaths differ between developed and developing countries however generally speaking, pregnancy-related complications (also called direct causes) contribute about 75%- 85% of total burden of maternal deaths while the remaining 15-30% are due to indirect causes (WHO et al., 2019; WHO, 2019a; WHO, 2019b). Obstetrics haemorrhage, hypertension complications, unsafe abortion, and pregnancy-related sepsis (PRS) are among the leading causes in this group (WHO et al., 2019 2017, WHO, 2019a; WHO, 2019b).

While the major causes of maternal deaths in developed countries have shifted towards pre-existing medical conditions during the past few decades, haemorrhage and complications of hypertension alone continue to be a challenge and the two causes are responsible for around 50% of avoidable maternal deaths due to pregnancy related conditions (Rath et al., 2018). It is important to note that pregnancy-related complications are generally unpredictable and therefore require functional health systems that can respond timeously and appropriately (Pattinson, 2015). Most of the maternal deaths can be prevented through making available, reliable emergency medical transport services, functional referral pathways and high-quality maternity healthcare services during antenatal, intrapartum and postpartum periods (WHO et al. 2019). The importance of a functional emergency transport was highlighted by the United Nation Population Fund which reported that 90% of maternal deaths that took place in Ghana in 2015 could have been if women had access to emergency obstetric care services (UNFPA Ghana, 2015). Despite this knowledge and the availability of cost-effective, evidence-based interventions that are also accessible to LMICs, pregnant mothers continue to perish at an alarming rate and this calls for a review of both the quality and also how maternal healthcare services are organised and provided in different settings (Alvarez et al., 2009; Pattinson, 2015). The above is supported by the Lancet Global Commission on High-Quality Systems (Kruk et al., 2018) and Hanson and colleagues (Hanson et al., 2020) as both have called for health systems redesign to ensure appropriate response to local drivers of maternal and new-born healthcare challenges.

2.4 Contributing factors

2.4.1 Determinants of maternal deaths

Various frameworks have been proposed to improve our understanding of the numerous factors that are associated and responsible for maternal mortality the response thereof (MacDonald et al., 2018; McCarthy and Maine, 1992; Thaddeus and Maine, 1994). The Four Delay Model (McDonald et al., 2018), a modification of Thaddeus and Maine's Three Delay Model (Thaddeus and Maine, 1994), is among the most useful frameworks. In this model, factors that contribute to maternal deaths are grouped into four levels: delay in deciding to seek help (Level I); delay in accessing healthcare facilities once a decision to seek help has been made (Level II); delay in recognising complications (level III) and finally, delay in receiving appropriate care after reaching healthcare facilities (Level IV). The Four Delay Model provides a practical framework for examining and tailoring responses to maternal deaths irrespective of the context.

2.4.2 Delay in deciding to seek help

A woman's socio-cultural environment, beliefs and cultural practices are some of the factors that contribute to delays in women deciding to seek help (Thaddeus and Main, 1994). Included among socio-cultural factors are societal beliefs about the status and position of women in society as well as patriarchal practices (Muheirwe and Nuhu, 2019; UN, 2019). In some societies women are not allowed to make health-related decisions. They must consult their husbands or senior family members for the family who would make the decision on their behalf (Alvarez et al., 2009; Fawole and Adeoye, 2015; Kaiser et al., 2019; Killewo et al., 2006; Sumankuuro et al., 2019). In addition to the above, some women have the sole responsibility of doing domestic work, such as taking care of their families and children, including cultivating the fields (Stokoe, 1991). The multiple roles played by women make it difficult for them to seek help when in need, and as a result, women tend to prioritise the needs of family members above theirs (Stokoe, 1991). Women may also delay seeking help because of inability to appreciate the seriousness of their health conditions as a result of lack of education or simply because of personal beliefs and views about illness and disease (Shiffman and Okonufua, 2007; Stokoe, 1991).

2.4.3 Delay in accessing healthcare facilities

Level II delay is influenced by socio-political context and cultural environments. This is because political policies are responsible for governments' investment and distribution of healthcare resources and cultural practices who is able to access those resources and circumstances under which these services could be accessed (Benoit et al., 2005; Jat et al., 2013; Kennedy and Kodate, 2015; Mbizvo and Say, 2012; Souza et al., 2014). The impact of political environment on women's health has been well documented. For example, women who live in war-torn and politically unstable environments have worse pregnancy outcomes compared to those who live in more politically-stable environments due to difficulties in accessing healthcare facilities (Parmar et al., 2019). Similarly, the high rate of maternal mortality in the USA has been attributed to the country's restrictive policies on access to family planning and TOP services (Hawkins et. al., 2020). Compared to the USA, Malaysia and Sri Lanka managed to reduce maternal mortality due to political commitment, deliberate policies and investment in healthcare resources (Pathmanathan et al., 2003). The above improved women's access to healthcare services.

Availability of healthcare facilities is not enough. Distance from home to health facilities, roads and transport infrastructure, availability and distribution of healthcare facilities, and women's ability to pay for transport services need to be address as they contribute to Level II delays (Benoit et al., 2005; Kennedy and Kodate, 2015). A review of maternal deaths by Ponku-Boansi et al. (2010) in Gushegu district in Ghana, found that transport infrastructure and access to transport services were two of the major factors that were responsible for the high burden of maternal deaths in this district. Similarly, Hanson et al. (2015) found high maternal mortality rate among women who lived more than 5km from a hospital in Tanzania. The same findings were reported by Souza et al., 2014 and Praxton et al. (2005). However, unlike the studies by Souza et al., (2014) and Praxton et al., (2005) Hanson (2015) found that impact of distance on maternal deaths was only significant when the quality of care was of an acceptable standard but did not hold matter when the quality of care was poor. From the above, a conclusion can be made that maternal mortality is affected by both distance from healthcare facilities as well as the

quality-of-care women receive after reaching healthcare facilities (Hanson, 2015). The latter contributes to a level III delay.

2.4.4 Level III: Delay in recognising complications

Overcrowding and lack of skills are some of the factors that contribute to the failure of healthcare workers to recognise severity of patients' illness and result in complications that could have been avoided if patients received timeous and appropriate healthcare interventions (Hanson et al., 2020; Kruk et al., 2018; Mothiba et al., 2019; Pattinson 2015; Sumankuuro et al., 2018).

2.4.5 Delay in receiving appropriate care after researching healthcare facilities

The fourth level of delay revolves around delay in receiving the right type of care after researching a healthcare facility. This delay is a result of lack of physical and human resources, dysfunctional referral system, lack of skilled personnel or overburdened and demotivated healthcare workers (Hanson et al., 2020; Sumankuuro et. al, 2018; Thaddeus and Maine, 1994). Together, the above factors contribute to poor quality of care. The role of quality of healthcare in maternal health outcomes was further highlighted by the Lancet Commission on High-Quality Health Systems (Kruk et al., 2018) and also identified to contribute to maternal mortality in South Africa by Pattinson (2015). The Commission stated that 60% of lives could be saved globally by simply paying attention to the quality of care. The quality of maternal and new-born health refers to the extent to which maternal and neonatal health care services are able to deliver appropriate, cost-effective, evidence-based, and safe healthcare timeously (WHO, 2016a). This is only possible when healthcare resources are distributed in an equitable manner but also able to adapt to changing healthcare needs (Kruk et al., 2018; Tuncalp et al., 2015; WHO; 2016a). Adaptability and equitable access are therefore some of the defining properties of high-quality healthcare systems. The elements of high-quality healthcare systems are summarised in Figure 2.1.

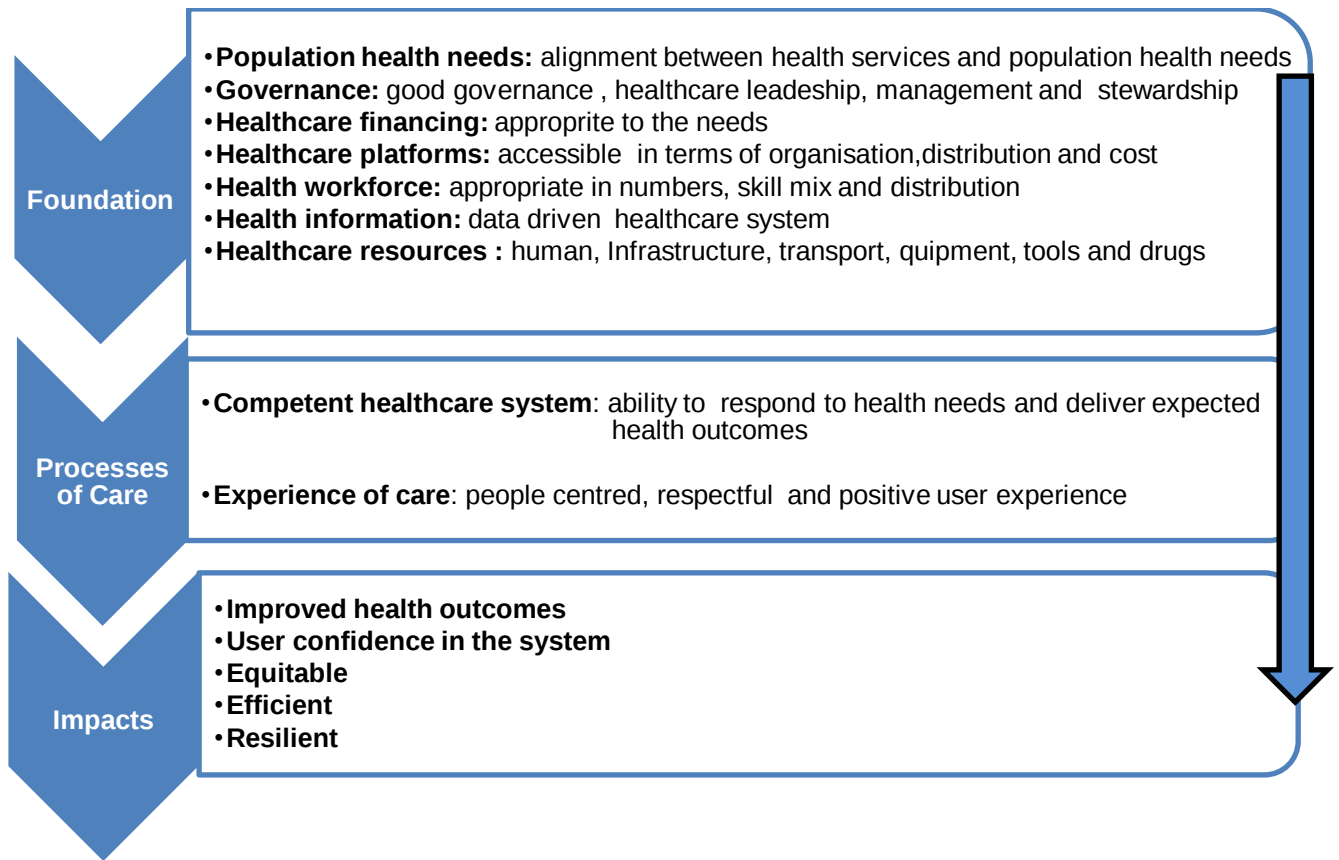


Figure 2. 1: Elements of high-quality healthcare systems

Adapted from Kruk et al., (2018) and Senkubuge et al., (2014)

Research on quality of healthcare systems has unearthed several challenges that are likely to prevent LMICs countries from achieving the 2030 SDGs if the challenges are not addressed in a timeous manner (Kruk et al., 2018; Sumankuuro et al., 2018). As mentioned previously arriving at a health facility does not guarantee survival for most women living in LMICs (Hanson et al., 2015). After overcoming political, social, cultural and community-related barriers, women who make it to healthcare facilities face additional barriers in the form of delay in receiving healthcare and when they do the care is often of poor quality and sometimes also involves harmful practices (Thaddeus and Maine, 1994).

A systematic analysis of the relationship between health systems and mortalities from studies involving 137 countries found that 58% of the deaths that were registered in these countries were due to poor-quality care and therefore preventable (Kruk et al., 2018). Similar findings were reported in a review of healthcare facilities-related maternal deaths in Western Africa by Gunawardena et al., (2018). This systematic review identified lack of resources (consumables, equipment, human and infrastructure) and referral-related problems to be among key drivers of poor quality of care and maternal deaths. A World Bank investigation into the readiness of health systems to meet the demand for obstetric services in Eritrea, found shortage of health workers, sub-optimal referral system, long distances between the lower level of care and the referral centre to be among the key drivers of adverse pregnancy outcomes (Sharan et al., 2010). In addition to the above a systematic review by Knight et al. (2013) found problems with adherence to guidelines, protocol violations and clinical practices that were not based on evidence to be responsible for maternal deaths. The above and other factors contribute to level four delay.

Mothiba et al., (2019) conducted a study to explore the lived experiences of practising midwives regarding challenges facing the provision of quality maternity healthcare services at a tertiary hospital in Limpopo Province, South Africa. This study reported that finds lack of resources; over-crowding; lack of knowledge among healthcare workers, including lack of support for frontline healthcare workers, were factors responsible for poor quality of maternity care in study settings. Another South African study by Maswime and Buchman (2016) investigating drivers of maternal deaths associated with caesarean sections in Gauteng Province concluded that lack of resources and lack of skills were behind caesarean section-associated maternal deaths. An analysis of maternal deaths due to bleeding at caesarean sections in the Saving Mothers' report found that that around 70% of the maternal deaths were preventable (Moodley et al., 2014). They were mainly a result of lack of staff, poor surgical competence of the surgeons and lack of essential drugs (Moodley et al., 2014). All these studies reviewed so far places poor quality of care of maternity healthcare systems in the centre of the high rate of preventable maternal deaths in LMICs.

Taken together, existing literature suggest that the shortage of healthcare resources, lack of functional referral system, lack of skills and essential drugs, are some of the key factors behind the poor quality of care and consequently, high numbers of maternal deaths in LMICs (Alwy Al-beity et al., 2020; Maswime and Buchman, 2016; Kruk et al., 2018; Mothiba et al., 2019; Sumankuuro et al., 2018). This lack of resources results in overcrowding, high workload, overburdened staff, and poor quality of care in maternity healthcare facilities (Pattinson, 2015; Wilunda et al., 2015; Mwaniki et al., 2016). It is therefore not surprising that overcrowding in healthcare facilities has been linked with unnecessary loss of lives because healthcare workers are unable to attend to patients on time and if they do, they do not have the necessary tools to deliver high quality care (Bateman, 2010; Sprivulis et al., 2006). The above point to the lack of poor political commitment, lack leadership, poor governance as well as poor management of healthcare services in affected settings (Aikman, 2019; Malakoane, 2020; Mwaniki et al., 2016, Pattinson, 2015; Pihlainen et al., 2016; Wilunda et al., 2015).

2.5 Social and economic consequences of maternal deaths

Maternal deaths have social, economic and health consequences for the surviving orphans, families, communities and the society at large (Miller and Belizan, 2015). A study by Moucheraud et al. (2015) in Butajira, Ethiopia looked at the survival of infants and children who lost a mother due to pregnancy-related conditions during the period 1987 to 2011. Majority of the women who died were from the poorest households and their orphaned children were 57 times more likely to die during their first month of life compared to those whose mothers were still alive. The authors attributed this finding to malnutrition and poor healthcare as a result of the loss of a mother and a caregiver. These children were left with no access to breastfeeding as their mothers died soon after, or around the time of birth. In addition, the loss of a mother meant that the children were left without a caregiver. This means that the orphaned children had no one to take them to healthcare facilities for immunisation, a situation that left them vulnerable to infectious diseases and childhood illnesses. Similar findings were reported by Molla et al (2015) in Ethiopia.

A study by Bazile et al., (2015) in Malawi corroborated the Ethiopian findings, shedding more light on the social and economic consequences of maternal deaths. This study

reported that orphaned children who were often left in the care of maternal female relatives, had difficulties in accessing healthcare services, experienced poor educational attainment, and were at a high risk of early marriages and risky sexual behaviour. In both the Ethiopian and Malawian study, the children's fathers were more likely to re-marry and to cut ties with their in-laws (Bazile et al., 2015; Moucheraud et al., 2015). When faced with an additional economic burden of taking care of orphaned children, extended family members often prioritised their own over orphaned children in terms of access to food, clothing and schooling (Bazile et al., 2015). In order to survive, these children resorted to doing manual work and child marriages, thereby creating a vicious cycle of early pregnancies and maternal deaths which culminate in more orphans (Bazile et al., 2015). Similarly, Yamin et al. (2013) found similar findings in a study conducted in Tanzania.

However, Knight and Yamin (2015), in a study conducted in the province of Kwazulu-Natal (KZN), South Africa did not corroborate the Ethiopian, Malawian and Tanzanian findings. This study took place in communities with a high HIV prevalence. Like other studies, orphaned children were also cared for by female members of the maternal household. However, unlike the situation in Ethiopia, Malawi and Tanzania, orphaned children in the KZN study experienced some level of economic protection due to the country's system of social and child grant as well as strong family and community bonds found within participating communities. However, despite the availability of social and economic support, the children were not able to escape the emotional and psychological impacts of losing a mother and this loss manifested in the form of behavioural problems and poor school attainment (Knight and Yamin 2015).

However, the findings from the study by Knight and Yamin (2015) were not reflective of all communities in South Africa. Houle et al. (2015) conducted a similar study in Agincourt, Mpumalanga. The focus of this study was to assess the risk of death among children who lost their mothers in rural areas with high rate of HIV. The study utilized data from the Agincourt Health and Demographic Surveillance System (AHDSS) for the period 1992 to 2013. Unlike the KZN study findings, children who lost their mothers due to pregnancy-related causes or complications of HIV and TB infections were more likely

to die when compared to children whose mothers were still alive. These findings are similar to those of Bazile et al. (2015), Moucheraud et al. (2015) and Yamin et al. (2015). Notwithstanding the minor differences, all the studies that were referred to in this section had one message in common- the negative socio-economic and health impacts of maternal deaths.

2.6 Chapter summary and conclusion

Maternal mortality remains high on the global agenda. Maternal deaths have both short- and long-term consequences on surviving children, affected families, communities, and the country's economy and social services. It is evident from the literature that most of the maternal deaths in LMICs are related to complications of pregnancy and potentially preventable with low-cost interventions that are easily accessible to LMICs. South East Asia and SSA bears the greatest burden of global maternal mortality. Dysfunctional healthcare systems in the form of ineffective care models and poor quality of care are among the key reasons

CHAPTER 3: MATERNAL DEATHS – A SOUTH AFRICAN PERSPECTIVE

3.1 Introduction

In the preceding chapter maternal deaths were discussed from global and regional perspectives with special emphasis on the causes and contributing factors. The focus of this chapter is on the causes and contributing factors for maternal death albeit from a South African perspective. In order to give context to the causes and contributing factors for maternal deaths in South Africa, the chapter commences with a brief description of the demography of the South African population and following on this, the organisation and financing of public healthcare services. A brief review of healthcare services during apartheid and especially the contribution of apartheid era health policies to the country's existing healthcare challenges as well as the impact of South Africa's healthcare reform on maternal deaths is also presented. Drawing on the numerous Saving Mothers reports, the chapter ends with a brief overview of the causes of maternal deaths in South Africa, contributing factors as well as the progress made in reducing maternal mortality over the years.

3.2 South Africa's demographic profile

South Africa is a middle-income country that is located in the most southern region of Africa. South Africa occupies an area of around 1220813 km². (https://www.nationsonline.org/oneworld/south_africa.htm). The country has the second largest economy in Africa after Nigeria (Conmy, 2018). South Africa's population is estimated to be just over 58 million, distributed among SA's nine provinces (Stats SA, 2019). Two-thirds of the country's population lives in urban and the remainder in rural areas. South Africa has the highest income disparity and worse health outcomes among the Organization for Economic Cooperation and Development (OECD) countries (Conmy, 2018). Around 8.5% of the country's GDP is spent on health, 60% of which is in the private sector (Conmy, 2018, Coovadia et. al., 2009). Because of her progressive constitution and economic status, South Africa is a preferred destiny for migrants in search of a better life, as well as for South African citizens from poorer provinces (Conmy, 2018, Coovadia et al., 2009, Mayosi and Benatar, 2014; UNICEF, 2019). Gauteng

Province which is considered to be the economic hub of South Africa is the largest in terms of population (Table 3.1).

Table 3. 1: Population of South Africa, 2019 mid-year estimate

PROVINCE	SIZE (IN SQUARE KM)	% OF TOTAL	POPULATION	% OF TOTAL
Gauteng	18,178	1.5	15 176 116	25.8
KwaZulu-Natal	94,361	7.7	11 289 086	19.2
Western Cape	129,462	10.6	6 844 272	11.6
Eastern Cape	168,966	13.8	6 712 276	11.4
Limpopo	125,755	10.3	5 982 584	10.2
Mpumalanga	76,495	6.3	4 592 187	7.8
North West	104,882	8.6	4 027 160	6.9
Northern Cape	372,889	30.5	1 263 875	2.2
TOTAL	1,220,813	100	58 775 022	100

Source: Stats SA (2019)

Gauteng receives the highest number of inter-provincial (internal) and cross border migration compared to other provinces, followed by Western Cape (Table 3.2).

Table 3. 2: Estimated provincial migration patterns for the period 2016 - 2021

PROVINCE	IN-MIGRANTS	% TOTAL OF IN-MIGRANTS
Gauteng	1 643 590	43.2
KwaZulu-Natal	303 732	8.0
Western Cape	493 621	13.0
Eastern Cape	199 855	5.2
Limpopo	302 226	7.9
Mpumalanga	297 949	7.8
North West	336 180	8.8
Free State	141 185	3.7
Northern Cape	89 252	2.3
TOTAL	3 807 590	100

Source: Stats SA (2019)

3.3 Healthcare in South Africa

3.3.1 Two parallel healthcare systems

Healthcare in South Africa is made up of two parallel systems, the under resourced public sector which provides healthcare services to 84% of the country's population (mainly Black majority), and private sector that provides healthcare services to the remaining 16% of the South African population utilising 60% of the country's total healthcare expenditure (Coovadia et al., 2009; Mayosi and Benatar, 2014). The private sector is funded by individuals who can afford medical aid contributions. Private healthcare is therefore inaccessible to the poor and this is one of the factors that are responsible for the differential health outcomes between the country's rich and the poor (Mabasa, 2015; Mayosi and Benatar, 2014). This situation continues to persist years post the democratic transition.

3.3.2 South Africa's public healthcare sector

The organisation of health systems in different countries depends on two factors, the political environment and the country's healthcare policies (Rechel et al., 2018). Health

systems across the globe are either centralised, decentralised or follow a hybrid model (Rechel et al., 2018).

In the centralised model of care, the power of decision making and implementation process reside with the central government (Rechel et al., 2018). A centralised healthcare model ensures alignment between policy and implementation and as a result, this model has been linked with better leadership, health system governance, coordination and oversight of healthcare services (Rechel et al., 2018). This is because policymakers are also policy implementers. This arrangement creates resonance between policy and practice. A major disadvantage of a centralised healthcare model is the distance that it creates between decision-makers and the recipient communities, and as a result community health needs and inputs do not always find their way into health policy and planning of healthcare services (Rechel et al., 2018).

Healthcare in South Africa follows a decentralised model which is based on a PHC philosophy which is delivered through district healthcare services or DHS (RSA, 2004). Among the many advantages of the DHS-PHC model are the equitable distribution of resources, community participation, and improvement in efficiency of healthcare services (Abimbola et al. 2019). Unlike the centralised healthcare model, decision-making power resides at regional and local government level (Munga et al., 2009; Rispel and Moorman, 2018). Despite these advantages, decentralised healthcare models suffer from many disadvantages, among them, vertical disconnection (Simpson, 2011; Peters, 2008). Vertical disconnection refers to a lack of translation of central plans at regional and local authorities (Peters, 2008). This is due to differences in translation and priority setting between policy makers and implementing authorities between central government, regional and local governments.

The South African public healthcare system is organised into national, provincial, and local health departments, each with its distinct role. These role and responsibilities are contained in both the White Paper for the Transformation of Health System in South Africa and National Health Act or NHA (RSA,1994; RSA, 2004). The national Department of Health (NDOH) is responsible for legislation, formulation of healthcare policy, establishment of healthcare standards and monitoring of the provision and the quality of

healthcare services. The NDOH is headed by a political head called the minister of health who is a member of the national cabinet.

There are nine provincial departments of health, i.e., one in each of the nine provinces (Eastern Cape, Gauteng, Kwazulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West and Western Cape). Like the National department of health each provincial department of health is headed by a political head, called a Member of the Executive Council or MEC. Provincial Departments of Health (PDOH) are responsible for planning and coordination of healthcare services as well as allocation of healthcare budget (RSA, 2004).

Local government is the third layer of government. This level of government is the one closest to the people. Local governments operate through municipalities and district councils. Municipalities are responsible for environmental health which include provision of clean water, pollution and waste management. Provincial Departments of Health delegates some of the healthcare functions to districts as districts are the locus of healthcare delivery in South Africa (RSA, 2004). According to the NHA, districts are the sphere of government that are tasked with determining health service needs and purchasing healthcare services (RSA, 2019). Unfortunately, this arrangement generates a gap between policy and implementation (Brauns and Stanton, 2015). Decisions taken at the provincial governments are not always congruent with the national agenda. This is because provincial governments are able to exercise some level autonomy in terms of allocation and management of resources based which is based on provincial needs and priorities (RSA, 2004).

3.3.3 Hierarchical arrangement of public healthcare facilities

Healthcare facilities in South Africa are organized in a pyramidal fashion, with the lowest level of care at the base and the highest at the top (Figure 3.1). This arrangement translates into primary, secondary and tertiary/central healthcare services. The different levels of care are linked together by a referral system. Patients enter the health system through PHC clinics and community health centres (CHCs). PHC and CHC clinic services are provided free of charge to everyone. Patients requiring higher level of care are

referred to DHs, RHS or tertiary/central hospitals depending on the need and complexity of the disease process. Together with district hospitals (DHs), PHC and CHC clinics form district healthcare services. More complex conditions are referred to regional, tertiary and central hospitals which provide cross-district and cross provincial healthcare services due to the limited number of tertiary and central hospitals in the country. All hospital services save for maternity, reproductive healthcare services and healthcare for children under six are at a cost. However, patients are charged according to their income (Consortium for Refugees in South Africa, 2017):

- H1: income less than R36 000 per year
- H2: income less than R72 000 per year
- H3: income more than R72 000 per year

The same principle applies to refugees and asylum seekers (Consortium for Refugees in South Africa, 2017).

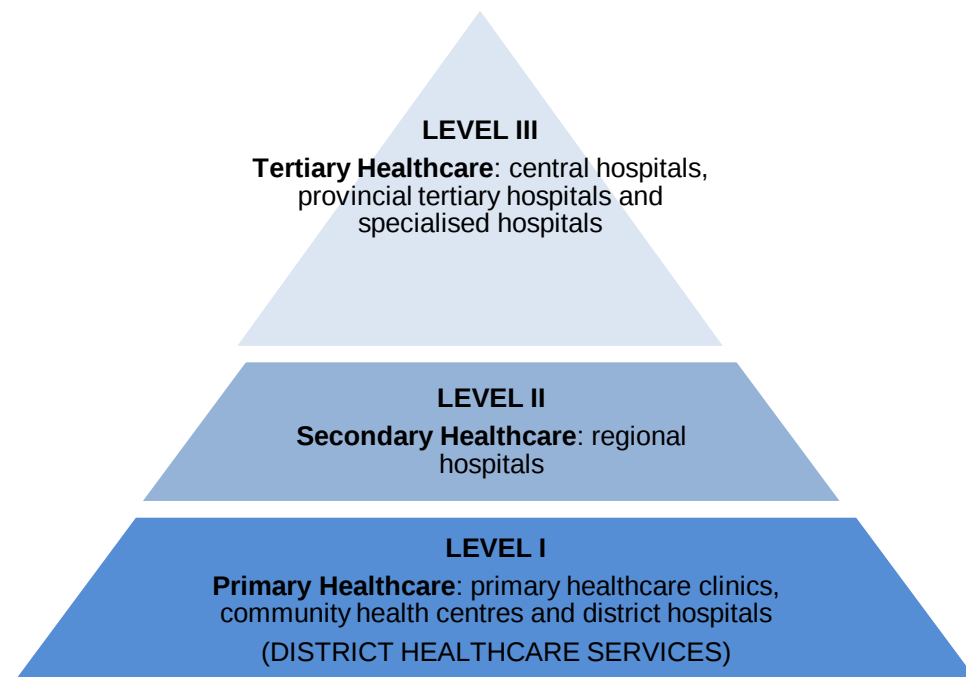


Figure 3. 1: Hierarchical organization of public healthcare facilities in South Africa

Each level of care has a well-defined service package with a corresponding healthcare worker skill mix that is responsible for delivering the services package. In primary healthcare clinics and CHCs, healthcare services are provided by nurses with family medicine specialists or general practitioners' support. District hospitals are staffed by generalists and provide emergency and general medical care, including limited obstetrics and gynaecological, surgical and paediatric services. Depending on the complexity of a disease, district hospitals refer patients to regional hospitals or directly to tertiary/central hospitals or specialized hospitals, such as TB and psychiatric hospitals. District hospitals do not provide a full range of radiological services, nor do they have a 24-hour laboratory or blood bank services. Regional hospitals are staffed by medical officers and specialists who provide specialist services such as obstetrics and gynaecology, general medicine, paediatrics and general surgery. Because of the service packages, all regional hospitals should have on-site 24 hour radiological and laboratory services, including 24hr access to blood products.

Central and tertiary hospitals are academic hospitals associated with universities. These facilities provide specialist and sub-specialist services. Most of the academic hospitals are located in South Africa's major cities. Specialist hospitals include TB and psychiatric hospitals. Specialist hospitals accept referrals from district, regional and tertiary/central hospitals. General practitioners working in the private sector refer patients to district and regional hospitals, while specialists in the private sector refer complicated cases to tertiary and central hospitals. With this model of care, the majority of patients should be cared for at the primary healthcare level with fewer patients referred to the higher level of care as one moves towards the top of the pyramid.

3.4 Healthcare during apartheid

Understanding the context within which healthcare systems operate is central to improving the functioning and performance of healthcare systems (Fonn et al., 1998). For South Africa this requires an understanding of the country's socio-political historical context and the apartheid healthcare environment. This knowledge is key to understanding current challenges facing healthcare services in South Africa (Coovadia et al., 2009). Coovadia et al (2009), Horwitz (2009), Strauss (2019) and Price (1986) provide a

comprehensive overview of how apartheid policies and practices laid the foundation for South Africa's current healthcare challenges.

The National Party Government introduced apartheid, a legalised racial discrimination system and segregation in 1948 (Coovadia et al., 2009; Horwitz, 2009; Price, 1988). The purpose of apartheid was to create a White political and economic supremacy to advance White minority domination over the Black majority. This was achieved using discriminatory policies and organs of the state which in the end, engineered social inequality in favour of the White minority group (Price, 1986).

In order to sell the apartheid ideology, the National Party Government packaged apartheid as a progressive tool aimed at promoting separate development, self-determination, and therefore, peaceful co-existence of South Africa's different racial and ethnic groups (Coovadia et al., 2009; Horwitz, 2009; Price 1986; Strauss, 2019). The Group Areas Act on 7 July 1950 solidified this agenda and effectively displaced Black people confining them to the poorly resourced and underserved 'Bantustans,' or homelands (Coovadia et al., 2009; Union of South Africa, 1950). Bantustans were made up of independent and 'self-governing' states and homelands (Coovadia et al., 2009). In their study, Coovadia et al. (2009) indicated that to prevent the majority of black people from becoming an economic burden to the White minority, Bantustans were established far away from cities and the country's economic hubs. As if the racial segregation was not enough, the apartheid government went further to divide the Bantustans using ethnicity (Brauns and Stanton, 2015). There were four 'independent' homelands (Bophutatswana, Ciskei, Transkei and Venda) and five 'self-governing' homelands (Gazankulu, Lebowa, KaNgwane, KwaNdebele, KwaZulu and Qwaqwa). Each of the homelands had a health department, which was in addition to the four provincial health departments of the main South Africa (Natal, Cape, Transvaal and Orange Free State). The Bantustans were at best, concentration camps for black people and were financially dependent on the central government.

Together with neighbouring African countries, the Bantustans became sources of cheap migrant labour for mines, farms and factories (Sawers and Stillwagon, 2010). To control

the movement of black people into Whites-only areas, the apartheid government introduced another piece of legislation, the Native Coordination of Document Act No. 67 of 1952, which became known as the 'Pass Law Act' (Institute of Justice and Reconciliation, 2006). All migrant workers had to carry a 'pass' to access work areas. A 'pass' was a form of an identity book. Migrant workers stayed in over-crowded, poorly-resourced, men-only hostels, far away from their wives and children. This separation between men and their families resulted in extra-marital affairs, homosexual practices and alcoholism (Reid and Walker, 2005). Equally, women whom their partners left behind in villages also engaged in extra-marital affairs, including commercial sex to survive (Coovadia et al., 2009). The migrant worker system was responsible for the break-down of black families and the spread of sexually transmitted infections (STIs) such as HIV/AIDS. In addition to HIV and AIDS, the overcrowded hostels became havens for infectious diseases like TB and cholera (Horwitz, 2001).

Despite the notion of independence and self-governance, all the Bantustans continued to depend on the South African apartheid government, which retained political and financial muscles (Horwitz, 2009). Generally, the South African government's investment in healthcare for black people was a quarter of that of white people hence, the differential health outcomes between black and white South Africans that continue to persist even to today (Van Rensburg, 2012). Bantustans experienced high levels of poverty, poor quality of education and healthcare, overcrowded hospitals and chronic lack of resources such as drugs, equipment, infrastructure and healthcare workforce (Coovadia et al., 2009; Horwitz, 2009). This situation continues to this day (Benatar, 2013; Malakoane, 2020; Maphumulo, 2019). Black people continue to suffer a disproportionately high burden of diseases and high mortality (Brauns and Stanton, 2016; Chopra et al., 2009; Coovadia et al., 2009).

Similarly, maternity healthcare services for black women were also neglected, poorly resourced and over-crowded (Cooper et al., 2004). Black women struggled accessing reproductive and maternal healthcare services during apartheid either because they were not available, overcrowded and when available, these services were of poor quality (Chopra et al. 2009; Cooper et.al, 2004; Coovadia et al., 2009). Maternal and neonatal

morbidity and mortality were disproportionately high among black compared to white women (Chopra et al., 2009; Coovadia et al., 2009; Cooper et al., 2004). It was in about 1974 that the government started investing in contraceptive services for black women; however, this investment was driven by a sinister motivation to curtail the population growth of the black people, which the apartheid government viewed as a threat to White existence and superiority (Kaufman, 2000; Klugman, 1993). Upon realising what the apartheid contraceptive policy's agenda was, homeland leaders decided not to promote or provide contraceptive services, further compromising rural women's lives and exacerbating economic hardship due to the large families that followed (Kaufman, 2000). Maternal health outcomes deteriorated even more.

3.5 Healthcare reform in South Africa

3.5.1 The dawn of the new era

The year 1994 brought to an end decades of apartheid rule, racial discrimination, social inequality and human suffering. The newly elected government of national unity that was led by the African National Congress (ANC) inherited a divided and unequal society, inefficient, poorly managed and a fragmented healthcare system with huge infrastructure and human resource backlogs (RSA, 1994). The new government wasted no time but immediately embarked on a social reform program aimed at unifying the country and addressing the socio-economic challenges brought about by decades of apartheid rule. In order to achieve the above, the new government enacted new laws, formulated new policies and strategies (Cooper et. al., 2004).

The country's new social and health agenda was informed by South Africa's progressive constitution as well as global and regional human rights statutes and declarations. South Africa became a signatory to both international and regional human rights declarations, covenants and statutes, few of which are discussed in the following sections.

3.5.2 International and regional Human Rights Covenants and Declarations

3.5.2.1 The Universal Declaration of Human Rights

The Universal Declaration of Human Rights (UDHR) was adopted in 1948 by the United Nations member states (UN, 1994). UDHR is founded on the principle of human dignity,

equality, individual, cultural, economic and political freedom. The declaration upholds that every human being has a right to healthcare of sufficient standard and quality, including access to basic amenities such as food, shelter, social and personal security, and, healthcare (UN, 1994).

3.5.2.2 The International Covenant on Economic, Social and Cultural Rights

Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) focusses specifically on health (PWESCR, 2015; UN, 1967). ICESCR recognizes individual's right to health that is of the highest achievable standard and places the responsibility of ensuring that this right is realised on the UN's member governments. In addition, the ICESCR places special obligations to the signatory countries to promote and support women's reproductive rights and to ensure that children are protected from harm, including harm related to pregnancy and childbirth (UN, 1967). ICESCR also recognises the importance of integrating preventative healthcare services to improve healthcare efficiency and the health of the population.

3.5.2.3 The Convention on the elimination of all forms of discrimination against women

Article 12 of the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW) requires UN member states to ensure women's access to appropriate maternity care throughout pregnancy and post-partum period (UN, 1999).

3.5.2.4 African Charter on Human and People's Rights

As a member of the Organization of African Union (OAU), South Africa signed the African Charter on Human and People's Rights, which declares that every human being has a right to the best state of physical and mental wellness (OAU, 1990). The World Health Organisation defines health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity", (WHO, 2006). This definition highlights the importance of social services (education, housing, hygiene, employment, etc.) in promoting individual and population health.

3.5.2.5 Key messages from the covenants and declarations

Taken together, the covenants and declarations referred to above recognise health as a fundamental human right and places the responsibility to ensure equitable access to affordable, comprehensive (preventative and curative) and quality health care upon member states of UN and OAU. This responsibility includes maternal, neonatal, child and reproductive healthcare services.

3.5.3 Post-apartheid legal and healthcare policy reforms

The post 1994 democratic transition ushered in a new era in South Africa. The ANC-led, democratically elected government, adopted a new constitution and introduced new legislations and policies. Below is a summary of the selected few that are relevant to maternal health:

3.5.3.1 The Constitution of the Republic of South Africa

South Africa's Constitution is the supreme law of the land (RSA, 1996a) and is described by Langa (2000) as the most progressive piece of legislation globally (Langa, 2000). The Constitution is founded on the principle of Human Rights and social justice and therefore forms the basic foundation of the country's social reform agenda (RSA, 1996a). In terms of the constitution, access to healthcare is a basic human right. The Constitution provides the legal framework that enable the realisation of the right to access healthcare services. The following entitlements are therefore provided:

- Access to healthcare services is for everyone. This access includes emergency treatment and reproductive healthcare services. Everyone is commonly interpreted to refer to anyone who lives in South Africa. This interpretation includes asylum seekers, refugees and undocumented migrants (Consortium of Refugees in South Africa, 2017).
- Access to food and water in sufficient quantity as well as,
- Access to social security and social assistance.

The Constitution places upon the state the responsibility to take reasonable steps to ensure that these rights are progressively realisation and enjoyed. This is an important

component of social redress considering that access to healthcare and basic services was one of the tools that was used by the apartheid regime to create social inequality (Ngwena (2000). By making access to essential healthcare services and emergency care within reach of everyone irrespective of their ability to pay for the services, the Constitution restored human dignity that was stripped away from individuals by apartheid, reaffirming the right to life as a fundamental human right (Ngwena, 2000).

Klinck (2011) raised an important observation pertinent to the South African society regarding the right of migrant populations to access healthcare services in South Africa. According to Klinck's (2011) argument, the constitution does not limit the right to access to healthcare services to South African citizens only, instead the Constitution extends this right to everyone. This view is also shared by the Consortium for Refugees in South Africa (2017). This is in direct contrasts with the National Healthcare Insurance (NHI) Bill, which limits asylum seekers and illegal migrants' access to healthcare to emergency healthcare services only (RSA, 2019). Whether this limitation of non-nationals' access to healthcare by the NHI is covered under the general limitations provided by section 36 of the constitution remains to be seen and likely to be contested (RSA, 1996a).

In addition to guaranteeing access to healthcare services for everyone, the constitution went further to address the time issue. How soon and to what extent can the right of access to healthcare services be realised given the country's economic climate and lack of resources in the face of other competing health needs? Pillay (2003) argues that the state must take reasonable steps to ensure progressive realisation of the right to healthcare services within available resources does not give the state licence to delay the realisation of this right perpetually. The key to unearthing the state's obligation is in the understanding of the words 'reasonable effort'. Wheeler (2014), a deputy Ombudsman from New South Wales, argues that in order for one to be judged to have acted reasonably, there must be evidence that the action is rational, appropriate for a given situation and there is evidence that other options were considered. Based on the above, one would have to look at the alignment between the state's investment in health compared to other social needs, the appropriateness between the health service design, resource allocation and the country's top priority needs in order to make judgement as to

whether the state has taken reasonable effort to enable access to healthcare services. The second yardstick would be to look at the impact of healthcare interventions as well as the state's response where the interventions failed to yield the desired results.

3.5.3.2 The Reconstruction and Development Program, the White Paper on the Transformation of Health System and the National Health Act (NHA)

The Reconstruction and Development Program (RDP), the 1997 White Paper on the Transformation of the Health System and the National Health Act are best discussed together because they all share a common theme. RDP describes the vision of the new political dispensation in broader terms while the White Paper on the Transformation of Health System translates the vision into a policy directive with regards to healthcare services reform (DOH 1997; RSA, 2004). The White Paper laid a strong foundation for South Africa's healthcare reform and the NHA (DOH, 1997; RSA, 2004).

The White Paper on the Transformation of Health System and the NHA acknowledged the injustices of the past and the need for re-dress (DOH, 1997; RSA, 2004). The recurring vision in both policy documents is on unifying the fragmented health services to create a single national framework to create a health system that is cost-effective, equitable, efficient and able to deliver quality healthcare. Both policy documents identify PHC approach and the DHS model as the official philosophy and delivery platform for healthcare services in South Africa respectively. The choice of PHC as the underlying philosophy of the delivery of healthcare services in South Africa and the DHS as the delivery platform has been made explicit in both the White Paper and NHA:

- The need to combine healthcare promotion, prevention and treatment under one roof to ensure comprehensiveness of healthcare services.
- To address health inequity by improving access to healthcare services to everyone,
- To create and improve access to healthcare including creating opportunities for community participation by bringing services closer to the people and,
- To improve the cost-effectiveness of healthcare services.

The White paper and the NHA drew inspiration from the RDP and the constitution of the Republic. The RDP (RSA, 1994) is a socio-economic framework based on five main principles:

- Improve the health of the nation and reduction in social determinants of health through multi-sector collaboration.
- To rebuild South Africa's economy to alleviate poverty and improve those who live in South Africa.
- Develop human resource to ensure adequate number, skill-mix, and equitable distribution.
- Improve access to basic needs (such as water, sanitation, nutrition) and
- Maintenance of a safe environment for the people to develop and thrive.

Drawing from the broad mandate of the RDP and the legal framework laid down by the Constitution, the White Paper and the NHA provide a set of 12 principles that has shaped the post-apartheid healthcare system in South Africa:

- Address fragmentation: The DHS was identified as the ultimate healthcare delivery vehicle. Its role is to provide health promotion, disease prevention and treatment. DHS has to ensure cooperation between districts as well as the private and public sectors. The cooperation will enable the pooling together of scarce resources and by so doing, prevent the duplication of services.
- Equitable distribution of healthcare resources: This was necessary to address the injustices of the past. The White Paper proposed dividing the country into functional health districts, bearing in mind the geography and the distribution of the population to ensure optimal management and functioning of the districts.
- Delivery of comprehensive healthcare services: In line with the PHC approach, the White Paper proposed standard healthcare packages for different levels of care. Maternal, reproductive and child healthcare services were also included in the district healthcare packages.
- Efficiency: The White Paper envisioned a cost effective and efficient healthcare services for South Africa. Health system efficiency refers to the extent to which healthcare services are able to deliver the desired results (Cylus et al., 2016). Healthcare services during apartheid were both inefficient, wasteful and

fragmented. Inefficiency would continue to perpetuate health inequity, violate individual's right to access healthcare services and waste the country's limited resources if allowed to continue. Ensuring efficiency is one step towards achieving universal healthcare coverage (Chisholm and Evans, 2010).

- Effectiveness: In order for the DHS to work, the health system should have a meaningful health impact on the recipients of health services. In terms of maternal health, efficiency can be judged by the reduction in maternal and neonatal morbidity and mortality, including improvement in the quality of life of women and their children. Effectiveness is an important measure of healthcare system performance (Al-Amin et al., 2016).
- Quality: Delivery of quality healthcare is enshrined in the Constitution of the Republic (Struckler et al., 2011). Like effectiveness, the quality of healthcare services can be judged on whether the care provided improves health outcomes (WHO, 2016a). Healthcare quality is synonymous with safety, efficiency, equity, people centeredness, timeous accessibility, and delivery by competent persons (WHO, 2016a).
- Equitable access to healthcare services: Access to healthcare during apartheid was determined by one's racial group, place of residence and the individual's ability to pay for services (Burger and Christian, 2018; Coovadia et al., 2009). The White Paper and the NHA hoped to achieve equity by bringing services closer to communities, making PHC cost free and creating an environment for intersectoral and, public and private collaboration.
- Community participation in health planning, delivery and monitoring of healthcare services: In contrast with the philosophy of the apartheid government, the ANC-led government affirmed the importance of community participation in achieving optimal health outcomes in both the White Paper and the National Health Act (DOH, 1997; RSA, 2004). The NHA identified clinic committees and hospital boards as vehicles health system governance. According to both the NHA an White Paper, the committees should be made up of:
 - Local government counsellor(s)
 - Community representative(s)
 - Clinic or CHC head

- Accountability to local communities: The rationale behind promoting community participation in the planning, governance and delivery of health services is to ensure that healthcare services are responsive to community needs and that government can be held accountable by communities for the quality of healthcare services it provides. The government reaffirmed its commitment to accountability through the introduction of patient charters (Batho Pele Principles), quality tools and accountability systems in the form of Office of Healthcare Standards (OHS), Health Ombudsman, patient safety committees, complaint reporting lines among others, as part of health system function and governance (DOH, 1997; DOH, 2002; DOH, 2011; DOH 2016).
- Decentralisation of healthcare and health system governance: The government chose the primary healthcare–district health care services (DHS-PHS) model as a vehicle for service delivery. In terms of the National Health Act No.61 of 2003 (RSA, 2004), district refers to a well-defined population within a particular geographical or administrative area. The underlying philosophy of the district healthcare model is to bring together under one roof, key stakeholders within a given district from government, NGO's, communities and the private sector. According to the NHA, districts follow municipal boundaries and are managed by the District Health Council (DHC) (RSA, 2004). The responsibilities and mandate of the DHC are set out in section 31 of the NHA (RSA, 2004):
 - To promote intersectoral collaboration between the different parts of government responsible for the provision of social and health services as well as between, NGO's and the private sector.
 - Coordinate the integration of healthcare and other services in a given district.
 - To serve as an advisor to the Member of the Mayoral Executive Council (MMEC) of health on healthcare related matters in the district.
 - Advice municipal council on district health and other related matters.
- Inter-sectoral collaboration: Health is a complex entity which influenced by a number of factors and therefore requires a multipronged approach and an inter-

sectoral collaboration. Inter-sectoral collaboration is critical in healthcare-related strategies because of the important role that socioeconomic factors play in determining population health. Poverty alleviation, access to housing, education and access to the job market, water and sanitation are critical factors that affect the health of the nation and health outcomes. Collaboration between different spheres of government, the private sector and NGO's is a prerequisite to achieve optimal individual and population health outcomes (RSA, 1996).

- **Sustainability:** Sustainability is concerned with how activities that are directed at addressing existing challenges are able to do so without exhausting the organizational ability to meet other future demands and challenges (Cassen, 1987). This requires a balancing act as well as evidence informed decision making. One way of achieving this is to ensure that the design of healthcare programs is scientifically sound, efficient and able to maximize the cost-benefit ratio (cost-effective) without compromising other social programs.

3.6 Health funding in South Africa

South Africa spends 8.8% of its GDP on health (Ataguba and Akazili, 2010, Coovadia et al., 2009; Health Policy Project, 2011). This is above the global average yet the expenditure does not translate into better health outcomes. The bulk (60% of the country's total healthcare budget) is in the private sector, and this sector is responsible for the healthcare of only 16% of the country's population (Coovadia et. al., 2009). This leaves the public sector with 40% of the country's total healthcare budget to look after the remaining 84% of the population (Coovadia et al., 2009). It is for this reason that the country continues to register poor health outcomes despite spending 8.8 % of its GDP on health (the bulk of the country's total healthcare budget is in the hands of the private sector). A country's financial investment in health has an influence on the availability and quality of its healthcare services (Ataguba and Akazili, 2010). The national government is responsible for public healthcare financing. The money is derived mainly from general and other forms of taxes (Ataguba and McIntyre, 2012; Ataguba and McIntyre, 2017). Since provincial governments are responsible for service delivery, healthcare funds are transferred from national government to provinces. Provincial revenue is made up of equitable share, conditional grants and own revenue (provincial taxes and other revenue).

Considerable effort has been made to that the allocation of financial resources is transparent and efficient (Benatar, 2013; Coovadia et al., 2009; Mayosi and Benatar, 2014; Mayosi et al., 2012). The equitable fund is made up of 6 components (Table 3.3).

Table 3. 3: Components of equitable fund

COMPONENT	EXPLANATION	% CONTRIBUTION OF THE TOTAL PROVINCIAL EQUITABLE SHARE (PES)
1. Education	This fund is based on the number of schools going population of 5 to 17 years and the number of learners in school (Grade R to Grade 12	48%
2. Health	Based on the provincial health risk profile, the proportion of the provincial population without medical aid and provincial patient load	27%
3. Basic component	Based on percentage provincial contribution to the total national population	16%
4. Institutional	Cover administrative services. Distributed equally among the 9 provinces	5%
5. Poverty	This is based on provincial income data. Higher for poor provinces.	9%
6. Economic	This is based on Regional Gross Domestic Product (RGDP) as calculated by Stats SA.	1%

(From James et al., 2018: Stats SA; 2019b; UNICEF, 2018; UNICEF, 2019)

In addition to the equitable share, national government also allocates conditional grants to provinces and local governments for specific national projects and mandates. These funds cannot be used for anything else other than the projects they were earmarked for (e.g., HIV and TB programs). Provincial and local governments also generate additional

funds in the form of income and duty taxes; however, these funds contribute a tiny portion of the total provincial budget (Ataguba and McIntyre, 2012; Ataguba and McIntyre, 2017).

During the 2018/2019 financial year DOH received 13.4% (R47.1 billion) of the total national government budget (R200 billion), spent 3% and transferred the rest (97%) to provinces (UNICEF, 2018). The 13.4% of the total government budget that was spent on health during the 2018/2019 financial year was below the 2001 Abuja Declaration signed by members of the AOU. This declaration commits member countries to spend 15% of the national budget on health (WHO, 2011). Similarly, the DOH received R51.5 billion in the 2019/2020 financial year, spent 3% of the funds and transferred 97% to provincial departments of health, 20% of which was transferred as conditional grants earmarked for specific services (Financial and Fiscal Commission, 2019; UNICEF, 2019). This figure was also below the 15% stipulated in the Abuja Declaration.

It is important to note that provincial governments have autonomy hence the final budget allocation depends on provincial priorities. This is because equitable shares can be redirected to other services based on provincial needs. Based on the equitable formula, Gauteng receives the biggest share of the overall provincial budget from national government, followed by KZN as seen in the 2019/2020 budget (Table 3.4). Similar pattern was seen in the 2017/2018 financial year (RSA, 2017). The two provinces are the largest in terms of population size.

Table 3. 4: Provincial health expenditure, 2019/2020

PROVINCE	TOTAL IN BILLION RAND (209.5)	% OF TOTAL PROVINCIAL BUDGET
Eastern Cape	25.2	12
Free State	11.1	5
Gauteng	50.8	24
KwaZulu-Natal	45.0	21
Limpopo	20.8	10
Mpumalanga	14.4	7
Northern Cape	5.2	2
North West	12.3	6
Western Cape	24.8	11

Source: UNICEF (2019)

The bulk of the provincial health budget is spent on district healthcare services followed by central and provincial hospital services. There has been minimal growth in budget allocation for seven financial years across the board with the exception of health sciences training and healthcare support services. While the reduction in administrative cost is a welcome development, the annual decline in budget allocation for infrastructure is a matter of concern. Similarly, the lack of tangible growth in the budget allocation for the DHS (which include PHC services) is also a concern. Table 3.5 is a summary of the above.

Table 3. 5: Provincial health budget spending in billion rands

FINANCIAL YEAR	2015	2016	2017	2018	2019	2020	2021	AVERAGE ANNUAL CHANGE
Administration	4	4	5	5	5	5	6	-3.8
DHS	70	77	84	94	98	105	113	1.2
EMS	6	6	7	8	8	9	9	0.5
Provincial Hospital services	29	29	32	35	37	39	43	1.4
Central hospital services	30	34	37	42	43	46	49	0.1
Training	5	5	5	5	6	6	7	3.2
Support services	1	2	2	2	2	3	3	4.7
Facility management	9	8	9	10	10	10	10	-3.8

Source: UNICEF (2019)

The South African government expenditure on health has remained stagnant for a very long time (Fig 3.2) despite the initial increase between 1995 and 2015 (Blecher et al., 2017). Due to economic challenges, the government decided to introduce fiscal tightening. This austerity measure led to a moratorium on the employment of healthcare personnel; reduction in infrastructure budget; centralisation of tender purchases (such as medical drugs), prioritizing services such as HIV/AIDS and TB treatment programs and prioritisation of social grants to assist the poor (Blecher et al., 2017). Maternal and neonatal healthcare services do not have separate budget allocation but are part of the HIV/AIDS and TB budget (UNICEF, 2019). Given the huge burden of HIV/AIDS and TB, the bulk of the budget allocation is spent on HIV/AIDS and TB.

Furthermore, the budget allocation for healthcare services is limited by tax invasion and the government's attempt to contain national debt by limiting borrowing contracted the fiscal space (Sibeko, 2019; Rispel, 2016; Rispel et. al., 2016; Vailani, 2019). The above occurs within an environment characterised by an increase in population size, hence creating a mismatch between the health budget and the country's health needs (Ataguba and McIntyre, 2017). This situation is further exacerbated by poor governance, weak leadership and rampant corruption (Rispel et al., 2016). All the factors discussed above work together to create a vicious cycle that is characterised by chronic underfunding, cut in the infrastructure and human resource budget, staff shortages, poor quality care, poor patient health outcomes, and inevitably, increase in medico-legal claims which further deplete healthcare resources (Sibeko, 2019). There is no separate budget for medico legal claims therefore hospitals use the budget allocated for goods and services to settle these claims (Maphumulo and Bengu, 2019). The cycle is unsustainable and only serves to compromise the government's ability to meet its constitutional obligations to ensure access to healthcare services for everyone (RSA, 2004). Unless urgently addressed, these healthcare challenges threaten the successful implementation of the much-awaited NHI.

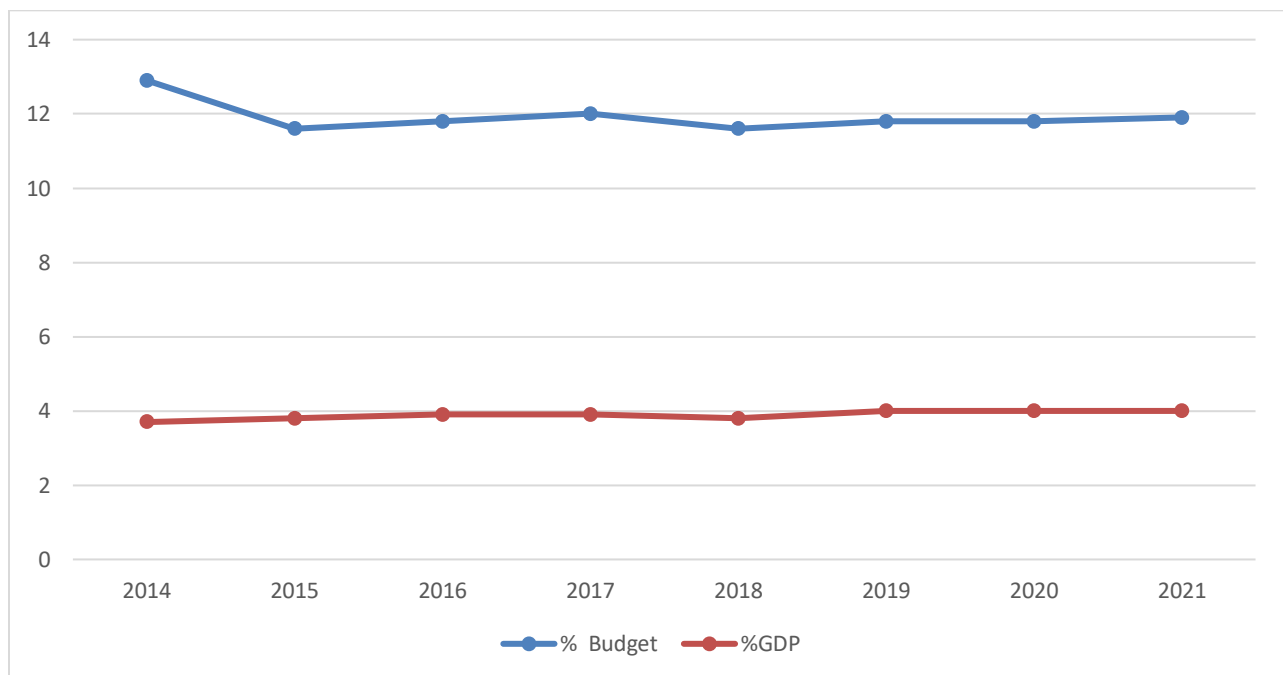


Figure 3. 2: South African Government expenditure on health

(Sources: Hlafa et al., 2019; UNICEF, 2019)

3.7 Public healthcare challenges post 1994

Despite the progress made in transforming South Africa's healthcare system, many historical healthcare challenges remained after the 1994 democratic transition. According to Mayosi and Benatar (2014), democratic South Africa faces numerous health and social challenges, among those, the quadruple burden of disease (HIV/AIDS and TB, life-style diseases, personal violence and injury, maternal and child mortality); growing social inequity; shortage of healthcare resources, increase in population growth and a growing number of international migrants.

In an attempt to address existing healthcare challenges, most of which had their roots in the apartheid era, the democratic government adopted a PHC approach and the DHS healthcare delivery platform to ensure equity in access to healthcare services as provided for by the Constitution of the Republic (RSA, 1996). Primary (clinic), maternal, reproductive healthcare services as well as healthcare for children under six were declared free. At the same time the government began to increase its expenditure on healthcare, built new clinics, introduced social security in the form of social grants, and introduced healthcare quality standards and oversight of healthcare services (Benatar, 2013; Coovadia et al., 2009; Mayosi and Benatar, 2014; Mooney and McIntyre, 2008). This new development marked the end of the apartheid era and served as a signal for a new social order.

There is no doubt that the above interventions have to some extent, improved the lives of South Africans primarily, due to the gains made in fight against HIV/AIDS (Benatar, 2013; Johnson et al., 2017; Mayosi and Benatar, 2014; Mayosi et al., 2012). However, the gains have been eroded plagued by poor leadership, weak management, lack of implementation of policies and widespread corruption (Coovadia et al., 2009; Maphumulo and Bengu, 2019; Rispel et al., 2016). The above have resulted in chronic shortage of healthcare resources, over-crowding and, increase in medico-legal challenges (Malakoane et al., 2020; Maphumulo and Bengu, 2019; Nkoane and Mavhandu-Mudzusi, 2020). As a result, the public healthcare system continues to suffer from poor quality of healthcare services and consequently, poor health outcomes (Maphumulo and Bengu, 2019).

3.8. NHI the next healthcare strategy

South Africa is now embarking on an ambitious project, the National Health Insurance (NHI). It is envisaged that through the NHI the country will finally achieve universal health coverage (UHC) by removing financial barriers to equitable access, creating a unified healthcare system and improving the efficiency and quality of healthcare services (DOH, 2015b). NHI is based on principles of affordability, efficiency, effectiveness, social solidarity and views health as a public commodity to be enjoyed by everyone regardless of their social or economic status (DOH 2015; DOH, 1997).

3.9 Maternal health in the post-apartheid political dispensation

3.9.1 Organisation of maternity healthcare services

There are different models of maternity healthcare services across the globe. Like the rest of healthcare services, the organisation of maternity services follows the on a DHS-PHC model of care and are provided in primary, secondary and tertiary healthcare facilities (DOH, 1997; DOH, 2015a).

Antenatal care is provided in primary (PHC clinics, DHs), secondary (RHs) and tertiary (PTHs and Centrals hospitals) healthcare services. Detailed discussion on staffing and services packaged for the different levels of care is available in the Guidelines for Maternity Healthcare Services in South Africa (DOH, 2015a). The general arrangement and staffing are similar to that of general healthcare services except for some modifications to suite maternity healthcare services (A brief discussion on the service packages and staffing for the different levels of care appear in the preceding sections). Similarly, PHC clinics are the point of entry into the maternity healthcare system and therefore responsible for the bulk of antenatal care. PHC clinics do not perform deliveries but instead refer patients to CHCs/MOU and hospitals based on the woman's risk profile. MOUs that are located inside hospital facilities are called Onsite Midwife Obstetric Units (OMBUs). An OMBU is a midwife-led maternity unit that is located adjacent to or within a hospital environment that provides comprehensive emergency obstetric and neonatal healthcare services (Long et al., 2016). Because of the proximity to a hospital, patients requiring hospital care are immediately referred. This arrangement eliminates the delays

associated with emergency transport services, which have been widely reported as one of the major contributors of maternal mortality in LMICs (Long et al., 2016). It is estimated that 60-70% of pregnant women using public healthcare facilities will require referral to a hospital at some stage during the pregnancy and 15% of pregnant women will require the services of a specialist at some point during pregnancy (DOH, 2015). An OMBUs is therefore preferred in areas where there is a shortage of general and emergency medical transport services. Similarly, OMBUs can assist in relieving pressure on RHs (Hofmeyr et al., 2014).

3.9.2 Improvement in access to maternity healthcare services

There has been a gradual reduction in maternal mortality over the years due to a number of interventions, a right based Constitution and countrywide rollout of antiretroviral treatment program, among others (Moodley et al., 2018; RSA, 2004). The turning point in maternal mortality began in around 2009 and a sustained decrease has been maintained till to date (Figure 3.3 and Figure 4.4). The adoption of the Constitution ushered in a political era and social reform agenda. New policies such as the Choice of Termination of Pregnancy ACT (CTOP) were introduced (RSA, 1996b). Free maternity care services improved access to maternity services. As a result, more pregnant women (76%) were able to access antenatal care in 2016 compared to 1998 (McKerrow, 2020; Stats SA, 2020). The biggest improvement in antenatal clinic attendance occurred in rural areas where 79% of women were able to access antenatal care in 2016 compared to 71.3% in 1998 (Stats SA, 2020). For the 2018/2019 financial year, 80.8% of pregnant managed to present for their first antenatal visit on time, however, this figure was below the 89.7% peak recorded in the 2008/2009 financial year. This perhaps suggests that the maternity healthcare system is no longer able unable to accommodate increasing patient numbers (McKerrow, 2020). Antenatal care attendance presents healthcare workers with opportunities to risk stratify pregnant women, tailor their antenatal, intrapartum and post-partum care or refer them to the next level of care if indicated. The decline in first antenatal clinic visit is therefore a concern.

In parallel with improvement in antenatal care attendance, in-facility deliveries improved from 83% in 1998 to 96% in 2016 (Stats SA, 2020). The increase in health facility

deliveries was accompanied by a decrease in home deliveries from 14 % in 1998 to 4% in 2016 (Stats SA, 2020). In terms of access to caesarean section, 24% of pregnant women delivered via caesarean section in 2016, compared to 16% in 1998 (Stats SA, 2020). This figure is above the internationally acceptable rate of 10-15%, and above the 5% minimum recommended by WHO (Betran et al., 2015). There is ongoing debate regarding the ideal caesarean section rate globally (Robson et al., 2013). Instead of the preoccupation with the rate, the focus should be on the quality of caesarean section. This is particularly important for South Africa given the high number maternal deaths associated with caesarean sections that has been reported in the different Saving Mothers reports over the years (DOH, 2003; DOH, 2012; DOH, 2014; DOH, 2018; DOH, 2019; DOH, 2020; Moodley, 2018; Moodley et al., 2018).

3.9.3 Maternal deaths, progress, causes and contributing factors

One of the important milestones in the history of maternal health in South Africa has been the establishment of the National Committee for the Confidential Enquiry into Maternal Deaths (NCCEMD) in 1998 (Bomela, 2020; Moodley, 2018; Moodley et al., 2018). The task of the committee is to analyse and report on maternal deaths and, provides recommendations that would assist in addressing the drivers of maternal deaths that the committee identified. The country witnessed an initial gradual rise in maternal mortality ratio(iMMR) between 1997 and 2010, peaking during the 2008-2010 triennium followed by a gradual decline thereafter (DOH, 2012; Moodley, 2018; Moodley et al., 2018). Whether the initial rise in iMMR was a reflection of high number of maternal deaths or improvement in reporting is still uncertain. There is no doubt that over the years reporting of maternal deaths has improved and the process has become more efficient (Bomela, 2020). The trend in maternal mortality ratio in South Africa between 2008 and 2017 is summarised in Figure 3.3. and actual numbers in Figure 3.4.

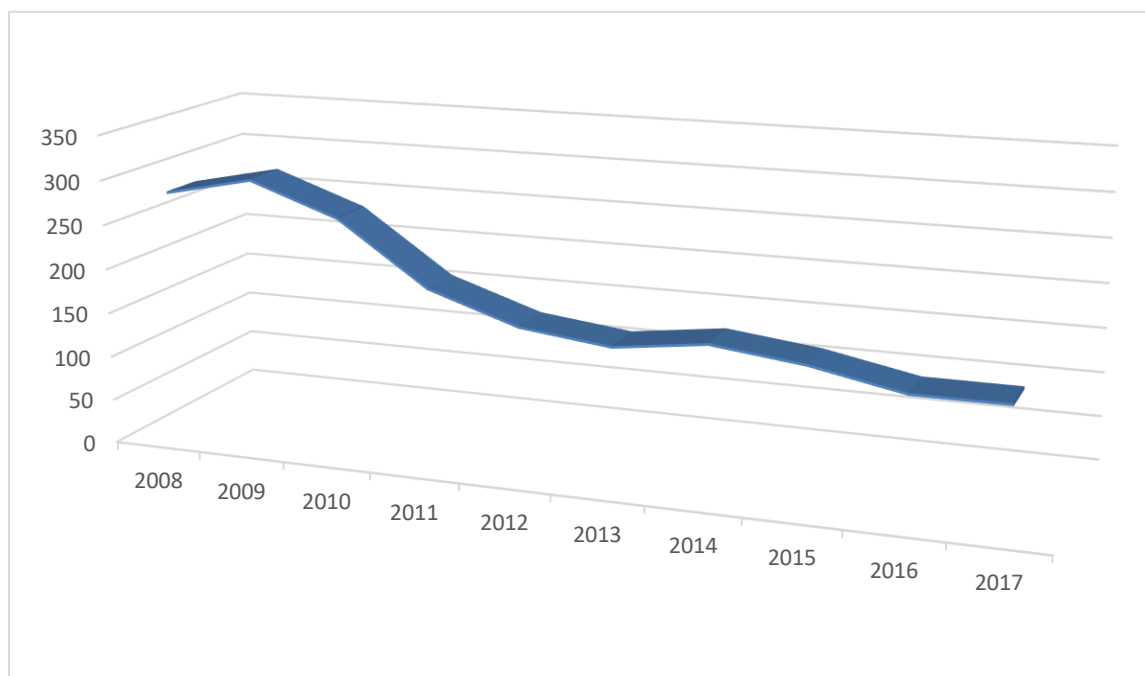


Figure 3. 3: Trend in the institutional maternal mortality ratio in South Africa, 2008-2017

(Source: DOH 2018; DOH 2019; Moodley, 2018, Moodley et al., 2018)

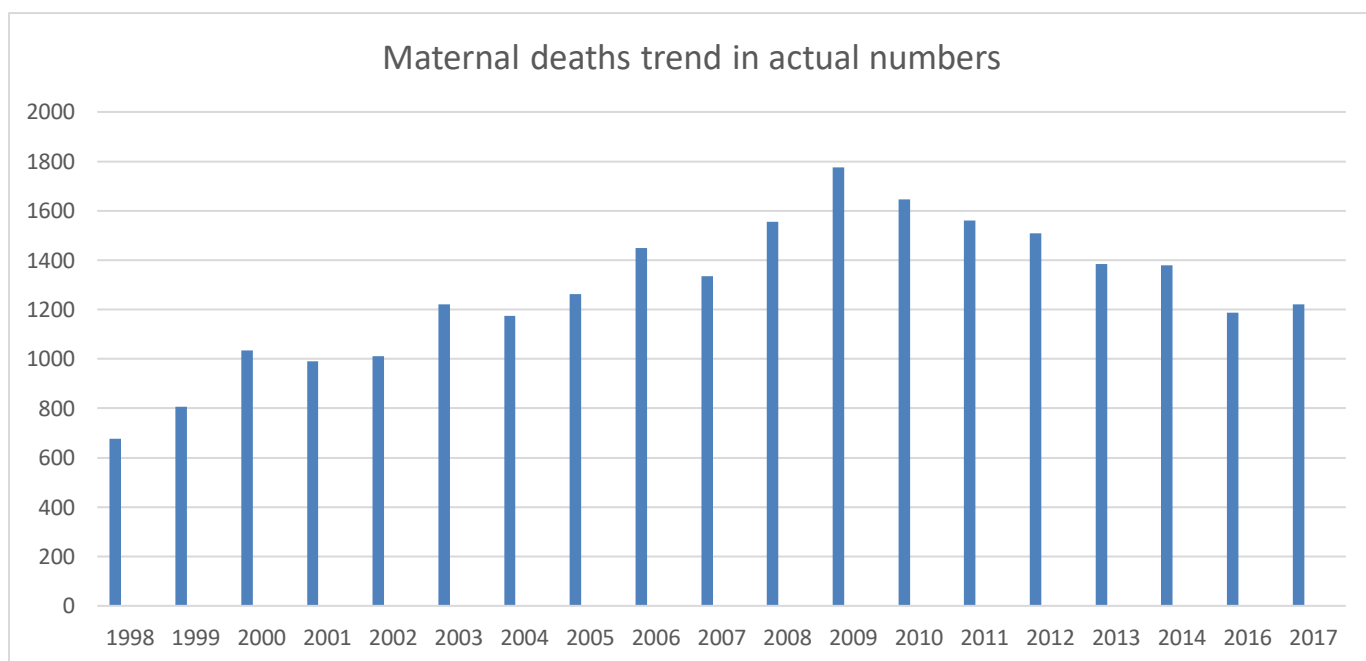


Figure 3.4: Trend in maternal deaths over time

(Source; DOH, 2019)

The highest number of maternal deaths during 2008-2010 triennium was registered in KZN, followed by Gauteng (GP). It is important to note that two provinces are the most populated of the nine provinces (Stats SA, 2019). The lowest number of maternal deaths were recorded in Northern and Western Cape, respectively. The main leading causes of maternal mortality during this period were non-pregnancy related infections (NPRIs), obstetric haemorrhage (OH), complications from hypertension (HPT), medical and surgical disorders (M&S) and pregnancy related sepsis (PRS) (DOH, 2012). The highest number of maternal deaths were in tertiary followed by regional hospitals. Close to 60% of maternal deaths were assessed to be potentially preventable, with patients, the health system and health workers contributing to the poor outcomes (DOH, 2012).

Following the report, the NCCEMD recommended a '5H' strategy. The '5H' revolved around improving management of HIV/AIDS, obstetrics haemorrhage, hypertension in pregnancy, training of health workers and strengthening the health system (including ensuring 24-hour access to emergency obstetric services and emergency transport) (DOH, 2012).

Similarly, the causes and distribution of maternal deaths across the nine provinces and levels of care during the 2011-2013 triennium were similar to those of the 2008-2010 triennial report (DOH, 2014). NPRI, OH and HPT remained the top three causes of maternal mortality. Bleeding during and after a caesarean section contributed to about 50% of OH-related maternal deaths. This was higher than the 26.2% recorded during the 2008-2010 triennium (DOH, 2012; DOH, 2014). Both the 2008-2010 and 2011-2013 triennial reports cited lack of resources (appropriately trained health workers, emergency transport, blood products, etc.) among the key contributing factors for maternal deaths (DOH 2012; DOH, 2014). The recommendations from the 2010-2013 triennial report remained the same as in the 2008-2010 report however there was minimal changes in terms of causes and contributing factors for maternal deaths (DOH, 2012; DOH, 2014).

After this period South Africa started to witness a gradual decline in maternal mortality however the causes and contributing factors for maternal deaths in the 2014-triennial report remained essentially similar to the preceding reports, with Gauteng Province continuing to register the highest number of maternal deaths compared to other provinces (DOH, 2018, DOH, 2020). During the 2014-2016 triennium, maternal deaths due to NPRI and OH declined by 47% and 22%, respectively, however instead of maternal deaths due to complications of HPT rose by 14%. (DOH, 2018). An important finding in the 2014-2016 report was that the iMMR, defined as the number of maternal deaths divided by livebirths in health facility multiplied by 100 000 started to plateau as from 2015 (DOH, 2018; Moodley et al., 2018). Provincial tertiary hospitals (PTHs) continued to record disproportionate numbers of maternal deaths when compared to PTHs' contribution to the total number of deliveries in the country. Majority of the women who died in PTHs were first seen in MOUs (43%), DHs (50%) or RHs (25%) (DOH, 2018).

Following the observation above, the NCCEMD concluded that either the women arrived late at PTHs when nothing could be done to reverse the situation or alternatively, the women died as a result of sub-standard care at PTHs. Overall, the report found healthcare worker-related avoidable factors in 35%, 57%, 44% and 42% of the maternal deaths that occurred in MOUs, DHs, RHs and PTHs, respectively (DOH, 2018). While the committee was able to identify substandard care, it was not able to provide an explanation or reasons for the delays in initiating treatment, substandard care and non-adherence to protocols. Overcrowding and staff shortage were suggested as possible explanations. Furthermore, like in previous Saving Mothers reports, delay in emergency transport contributed to 32.5%, 55.2% and 79.9% of the avoidable maternal deaths among women who were referred from MOUs, DHs and RHs to the next level of care respectively (DOH, 2018).

The most recent triennial report (2017-2019) recorded a further decline in maternal mortality despite the plateau in HIV related deaths noted in 2017 (DOH, 2019). The country's iMMR dropped to 113.8 (DOH, 2020). Four provinces (Gauteng, Kwazulu-Natal, Mpumalanga and Western Cape) managed to achieve an iMMR of less than 100 however the most notable reduction was recorded in the Western Cape, Kwazulu-Natal and Mpumalanga respectively (DOH, 2020). Similar to previous reports the four leading

causes of maternal mortality were NPRI, HPT, OH and M & S. For Gauteng the main causes of maternal deaths from highest prevalence to lowest were NPRI, HPT, M&S and at number four, OH. There was a significant improvement in maternal deaths related to OH during the 2017-2019 triennium when compared to 2014-2016 triennium where OH was the third commonest cause of maternal deaths in Gauteng (RSA, 2018). The reported decrease in maternal deaths occurred despite the 28.1% reported increase in caesarean section rate. This finding suggests that the safe caesarean section protocol that was implemented nationally following the last triennium report was successful.

Despite the above successes, 62.4% of maternal deaths were assessed as potentially preventable. The main contributing factors associated with avoidable maternal deaths included delay in seeking help, challenges with transport from home to facilities, illegal abortion, sub-standard management and shortage of staff. In terms of sub-standard care, the figures were 80% for DHs and 60% for MOUs and RH (DOH, 2020). The high rate of sub-standard care continues to cast a shadow of doubt regarding the quality of care in South Africa. While high rate of substandard care that was reported in MOUs seems to support the call to centralise maternity care to hospitals, the 80% rate of sub-standard care suggests that the problem is beyond the clinic -hospital divide and therefore calls for re-examination of South Africa's model of maternity healthcare services.

3.10 Summary

In this chapter, a focused review of healthcare services and maternal mortality post the 1994 political transition was presented. The post-apartheid political transition ushered in new political and social agenda whose foundation was on social solidarity, social cohesion, equity and human rights. After coming into power, the democratically elected ANC-led government embarked on a journey of social reform with special focus on reversing the legacy of apartheid and improving the lives of the South African population. This commitment saw the adoption of a progressive Constitution, enacting of new health legislations and policies and adoption of the DHS-PHC model of care. Following the gradual improvement healthcare spending, increased focus on maternal and reproductive healthcare and country-wide roll out of ARVs, among others South Africa started to register a gradual decline in maternal mortality which continued to date. However, health

system factors continue to contribute to a high number of preventable maternal deaths, a finding that calls for a review of maternity healthcare services.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter presents a detailed account of the steps, procedures and process followed in the collection, analysis and interpretation of data, the researcher's underlying assumptions and justification of the choices made. The choice of research question depends, among others, on the researcher's underlying philosophical assumptions or worldview which influence the research design, data collection methods, analysis and interpretation (Creswell and Creswell, 2018; Creswell and Poth, 2018). The aim of the study was to assess the strengths and weaknesses of the organization/ configuration of maternity healthcare services in Gauteng, in particular, the CPF as implemented in the CMJAH maternity cluster in order to identify gaps/healthcare barriers and use this information to recommend healthcare services improvement strategies.

Therefore, the study sought to answer the following questions:

- How are maternity services configured or organised and what is the impact of this configuration on the functioning and provision of maternity services in Gauteng?
- What are the lived experiences and perceptions of frontline healthcare workers and their immediate supervisors regarding this configuration and functioning of maternity healthcare services in Gauteng Province?
- How can maternity healthcare services be improved to deliver accessible, safe, and quality healthcare to ensure a sustained reduction in maternal mortality in the province?

Using Stufflebeam's Context, Input, Process, Product (CIPP) model (Stufflebeam, 2003) and the CMJAH cluster as a case study, the specific objectives of the study were:

- To describe the organization or configuration of maternity healthcare services in Gauteng and the impact of the configuration on the functioning and provision of maternity healthcare services in Gauteng.
- To explore and describe health care and health system barriers and enablers in the functioning and provision of maternity healthcare in Gauteng.

- To explore and describe the experiences and perceptions of frontline healthcare workers and their immediate supervisors regarding the configuration, functioning and provision of maternal care services in the province.
- To use the findings of the study to gain insight into challenges that the province's healthcare services face.
- To use the findings to make recommendations for improvements in maternity care and general healthcare services.

4.2. Research paradigm

There are different definitions of research paradigm, but in this discussion, research paradigm is defined as a 'basic set of beliefs that guide actions' (Lincoln et al. 2011). Research paradigm is the basic architecture of a research process that influences the choice of the research design, methods of data collection, analysis, and interpretation (Kivunja and Kuyini, 2017; Lincoln et al., 2011). The list of research paradigms continues to grow however positivism, interpretivism(constructivism) and pragmatism remain the main research paradigms and the three are the commonly used paradigms in scientific research (Kivunja and Kuyini, 2017).

4.2.1 Positivism

Positivism views reality as external, objective and independent of human experience or perceptions (Creswell and Creswell, 2018; Kivunja and Kuyini, 2017). The discovery of reality is therefore through observation (Kuvunja and Kuyini, 2017). According to positivism, any knowledge gathered by other means other than objective scientific tools and process does not count as truth (Mills, 2010). Positivism is concerned with cause and effect and therefore uses scientific experiments to discover truth that is then used to draw generalizable laws that can be applied to other contexts and settings (Creswell and Creswell, 2018; Kivunja and Kuyini, 2017; Mills, 2010). Positivist researchers utilise quantitative research methods to test hypothesis and statistical measurements in order to determine cause and effect or alternatively, association (Kivunja and Kuyini, 2017).

However, the views of positivism are not universal (Babbie 2010, Fox, 2008). Positivism as a paradigm ignores the role played by context human experience and perceptions in the generation of knowledge (Fox, 2008).

4.2.2 Interpretivism /constructivism

Interpretivism and the constructivism research paradigm emerged out of the growing dissatisfaction with the positivist stance regarding the existence of reality and ways of knowing and obtaining knowledge (Creswell and Plano Clark, 2011; Lincoln and Guba, 1985; Teddlie and Johnson, 2009). The interpretivist-constructivist paradigm disputes the existence of objective truth but instead views reality as constructed by humans from their personal experiences and perceptions (Creswell and Plano Clark, 2011). Interpretivist researchers view reality as multiple, subjective and context-dependent (Erlingsson and Brysiewicz, 2013). Instead of looking for measurable truth that is generated through the scientific instruments, interpretivism focuses on understanding social reality from the account of social actors which is based on personal perceptions, lived experiences, interpretations and the meaning the actors attach to their experiences (Creswell and Plano Clark, 2011; Fox, 2008).

According to Fox (2008), interpretivist-constructivist research does not seek to infer cause and effect from research, instead interpretivism and constructivism seek to understand social phenomena and subjective meanings generated by humans in the course of everyday activities and interactions. This understanding requires active participation of the researcher who often has to make sense of research participants' accounts of their social experiences, interpret those experiences, and use the data to draw up key messages in order to construct social theory to explain these experiences (Denzin and Lincoln, 2003). Based on the above, researchers that engage in interpretivist research are expected to reflect on their own experiences and personal biases as well as the influence of these biases on the interpretation of research findings (Fox, 2008). The process of reflection assists in making sure that the researcher's interpretation of the research phenomenon is not from his/her own biases but a true reflection of participants experiences. This process is called reflexivity (Fox, 2008).

4.2.3 Pragmatism

Interpretivist-constructivist paradigm has also not escaped criticism. Both positivist and interpretivist paradigms have been criticised for their purist and dogmatic stances regarding the nature of reality and knowledge, including ways of knowing and acquiring knowledge (Johnson and Onwuegbuzie, 2004; Howe; 1988). Pragmatism as a research paradigm adopts a middle ground between the objectivist stance of positivism and the subjectivist stance of interpretivism/constructivism (Johnson and Onwuegbuzie, 2004). Although pragmatism acknowledges objective reality, it argues that reality becomes meaningful only once it has been experienced and interpreted by humans (Tashakkori and Teddlie, 2008). In other words, although reality and knowledge exist independently, they must be experienced to become meaningful (Kaushik et. al, 2019). This is a far cry from the position adopted by positivism which does not acknowledge the role subjective human experiences and interpretations in the generation of knowledge.

Instead of being preoccupied with abstract arguments regarding the nature of reality nor the forms through which knowledge exists, pragmatist researchers seek practical ways of solving real life's problems (Brierle, 2017; Kaushik et al., 2019). They look for the best available research tools and instruments that would enable them to answer research questions (Brierle, 2017). It is for this reason that makes pragmatism an action orientated research approach. Pragmatism combines the advantages of quantitative and qualitative research approaches in a single study called mixed method research (MMR) to solve research problems (Creswell and Creswell, 2018; Tashakkori and Teddlie, 2003).

4.3 Research design and rationale

Research design broadly refers to the overall plan that guides the research process, starting from the choice and formulation of the research question(s), choice of data, data collection methods and analysis, including data interpretation (Mackenzie and Knipe, 2006; Lincoln et al., 2011). Informed by a pragmatist worldview, this thesis utilised a convergent mixed-method study design to assess the strengths and weaknesses of the organisation or configuration of maternity healthcare services and the impact of this configuration on the functioning and provision of maternity healthcare services in

Gauteng Province, South Africa. By virtue of combining quantitative and qualitative data, a mixed method design is considered to be the most appropriate study design for investigating complex phenomenon such as healthcare service because MMR design creates opportunities to investigate a research problem from different research perspectives using multiple sources of data (Tariq and Woodman, 2013).

The mixed-method approach has been used in research involving disciplines such as sociology, education, healthcare, management sciences and psychology since the 1980's (Creswell and Creswell, 2018; Hou and Feters, 2019; Johnson and Onwuegbuzie, 2004; Regnault et al., 2018; Tariq and Woodman, 2013). Detailed accounts of the origin, evolution and application of MMR design have been well covered by authors such as Creswell and Plano Clark, (2011); Creswell and Plano Clark, (2018); Denzin and Lincoln, (2003); Denzin and Lincoln, (2011) as well as Teddlie and Tashakkori; (2008). It is clear from the literature is that MMR continues to evolve while also gaining in popularity as evidenced by its application in many disciplines (Timans et al., 2019). Healthcare is one of the disciplines where MMR is increasingly utilised to investigate healthcare and health system related phenomena (O'Cathain et al., 2007; Tariq and Woodman, 2013).

MMR design is most useful when one form of data is unable to adequately answer the research question, when there is a need to explain the study's findings (e.g., qualitative data used to explain qualitative findings) and when the aim of the research is to develop or testing hypothesis, among others (Creswell and Plano Clark, 2011; Doyle et al. 2016). Assessing the strengths and weaknesses of maternity healthcare services require a deeper understating of the structure of maternity services and guiding philosophy, how maternity healthcare services are governed and coordinated, healthcare services load, health services inputs in the form of human, infrastructure and resources, including experiences and perceptions of healthcare care providers. Numerical values, observations during site visits, documentary review minutes of the cluster morbidity and mortality meetings, healthcare workers' account and experiences of maternity healthcare services gathered through interviews, would not have, on their own, given a complete

picture that was achieved by combining them. The structure of the convergent MMR design as applied in the thesis is illustrated in Figure 4.1. below.

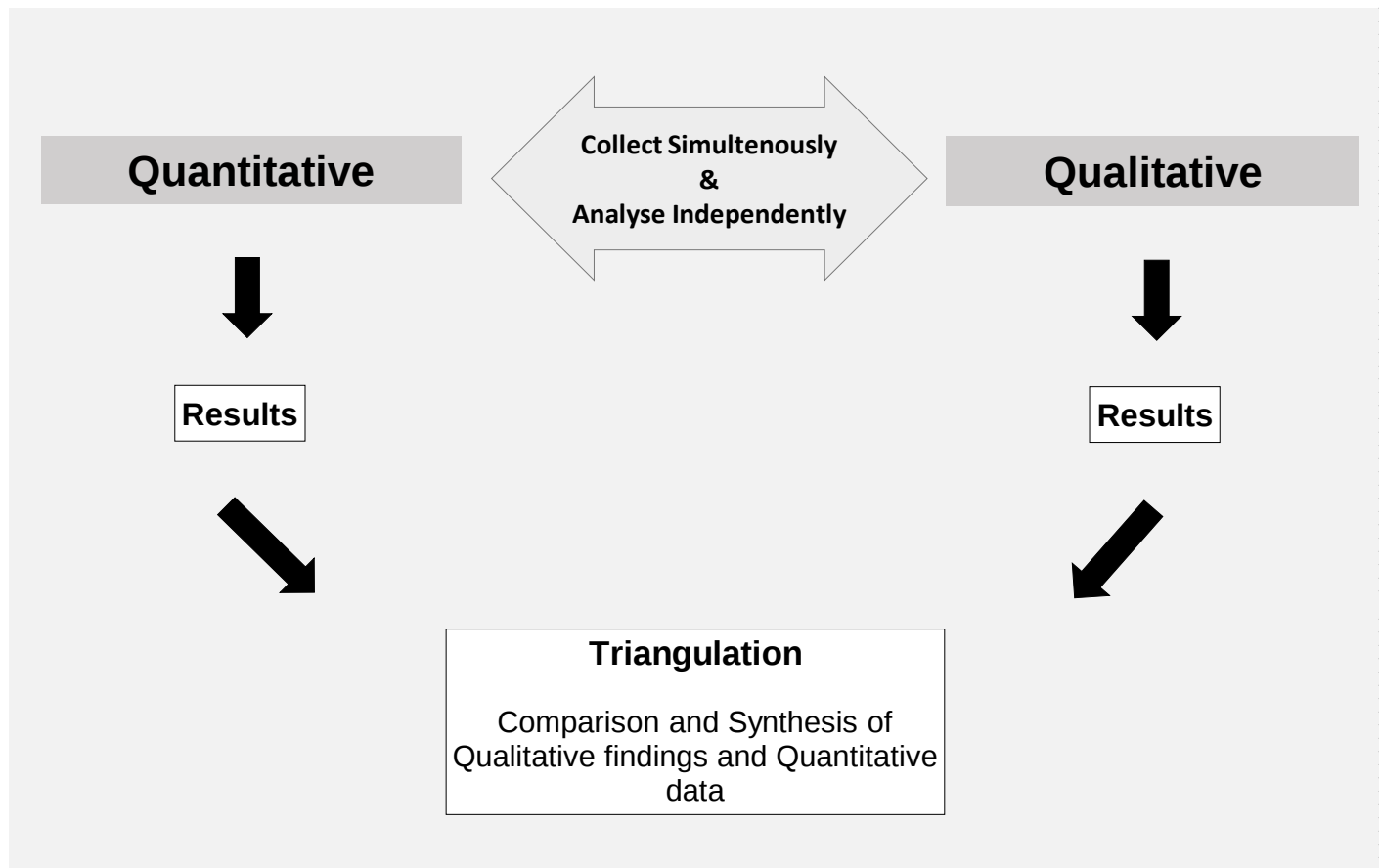


Figure 4. 1: Convergent mixed-method study design

(Adapted from Creswell and Plano Clark, 2018)

4.4 Study setting

The study took place in the Charlotte Maxeke Obstetrics and Gynaecology clinical cluster in Gauteng Province, South Africa. The cluster spans three health and geographical districts (City of Ekurhuleni, City of Johannesburg and the West Rand district)

4.5 Data collection and analysis

The process of data collection was in accordance with the convergent mixed method research design approach (Creswell and Plano Clark, 2018; Creswell and Creswell, 2018):

- Quantitative and qualitative data were collected independently and concurrently.

- Both set of data had equal weighting.
- Each set of data was analysed separately.
- Triangulation of quantitative and qualitative components. According to De Vos et al (2011), triangulation can be achieved in three ways:
 - Data triangulation: use of data from different sources to answer the research question(s).
 - Method triangulation: two or more methods used in one study.
 - Space triangulation: studies performed in more than one socio-cultural context to improve the richness of the study.

The study involved an independent collection and analysis of quantitative and qualitative data and integration/triangulation of the results during discussion. This was done to comply with the quality requirements for the respective research methodologies and to enhance the study's findings and quality requirements. This process is summarised in Table 4.1 and discussed in detail in the next sections.

Table 4. 1: Summary of the research process

Research paradigm	Pragmatism
Study design	Convergent mixed method research
DATA COLLECTION	
Quantitative	Qualitative
• Maternity Healthcare Facility Questionnaire: Number of facilities, spread, resources • Audit: deliveries and maternal mortality	• Face-to-face interviews with frontline healthcare workers and their immediate supervisors • Site visits • Review of Cluster Policy Framework (CPF) and corresponding referral policy

	Review minutes of cluster morbidity and mortality meetings
DATA ANALYSIS	
Quantitative	Qualitative
- Descriptive statistics: Actual numbers, percentages, mean/average - Inferential statistics: Institutional maternal mortality ratio (iMMR)	Qualitative: Thematic analysis
TRIANGULATION	
Results	
QUALITY CRITERIA	
Quantitative	Qualitative
Validity and reliability	- Credibility - Transferability - Dependency - Confirmability - Quality frameworks
ETHICAL CONSIDERATION	
- Ethical clearance by Human Research Ethics Committee (HREC), University of the Free State and Gauteng Provincial Health Research Ethics Committee (GPREC) through the delegated districts and hospital ethics committees - Permission from participating institutions - Informed consent - Guarantee for confidentiality	

4.5.1 Quantitative study

4.5.1.1 Introduction

Using the CIPP model, the quantitative component sought to collect numerical data to assess:

- *Context*: Service load in the form of maternity deliveries.
- *Input*: Resources (human and infrastructure).
- *Product*: health system service performance using maternal mortality data and lived experiences and perceptions of health workers.

Using the CMJAH as a case example, the purpose of the study was to assess the strengths and weaknesses of the organization of maternity healthcare services in Gauteng, identify service gaps/health system barriers and use the information to recommend service improvement strategies. For this reason, the study focused on the aspects of the maternal mortality audit that were relevant to the study questions. It is for this reason that study did not embark on detailed analysis of the causes, avoidable or contributing factors of maternal mortality. The reader is referred to the Saving Mothers reports (DOH, 2003; DOH, 2012; DOH, 2014; DOH, 2019; DOH, 2020).

4.5.1.2 Study sample

Because the focus of interest was on gaining insight into the organisation and functioning of maternity services in Gauteng, the study included all healthcare facilities representing the different levels of care in the Charlotte Maxeke Johannesburg Academic Hospital cluster. Data was obtained from 21 healthcare facilities made up of 10 community healthcare centres (CHCs) or midwife obstetric (MOUs), four district hospitals (DHs), Six regional hospitals (RHs) and one central hospital. There is only one provincial tertiary hospital in the cluster however this hospital was not included since it did not offer mother and child services. The above facilities also serve as referral centres for primary healthcare clinics, private general practitioners (GPs) and private specialists for complex cases including low risk patients not on medical aid. Furthermore, the cluster accepts referrals from other provinces (Limpopo, Mpumalanga, North West) and the SADC region. The CMJAH cluster is therefore one of the largest in terms of facility and referral networks but also in terms of geographic size which spans three districts and at least four provinces. The CMJAH cluster was therefore the most suitable cluster to study a healthcare

innovation which is directed at improving the functioning and quality of healthcare services.

4.5.1.3 Techniques and tools for data collection

Data collection was achieved using two methods:

4.5.1.3.1. Audit of healthcare facilities using a Questionnaire

Data on resources (number and categories of maternity beds, number and categories of staff) was collected from all healthcare facilities in between 1st July 2019 to 31st December 2019 using a purposefully designed questionnaire (Appendix R). The questionnaires were either sent via an email or hand-delivered to the departmental heads (HODs) of obstetrics and gynaecology, maternity operational managers (OMs) of the participating hospitals as well as to the CHCs/MOUs respectively. Participating institutions were reminded about the questionnaires during cluster morbidity and mortality meetings, using phone calls/ text messages and emails. Completed questionnaires were either emailed or handed over to the researcher during the cluster morbidity and mortality meetings. The principal researcher also visited facilities which did not return the questionnaires and assisted them in completing the required information. All questionnaires were returned. Distance and travelling time between healthcare facilities were calculated using Google maps and where possible, were compared with the actual travelling time recorded during facility visits.

4.5.1.3.2. Audit of deliveries and maternal deaths

The monthly cluster morbidity and mortality (M&M) meetings were used to identify and collect data on deliveries, maternal deaths, causes and contributing factors. Missing data and additional information were obtained from the participating healthcare facilities and collated with the DHIS data that was supplied by the monitoring and evaluation unit of GDOH. This information was collected in the Microsoft Excel spreadsheet (patient identification data removed) and later analysed to calculate the total number of deliveries, maternal deaths and iMMR for each healthcare facility. Data collection for the above took place during the period 1st July 2019 to 31st June 2020. This data was for the period 1 January 2017 to 31 December 2019.

4.5.1.4 Data processing and analysis

Data was captured into Microsoft Excel spreadsheet and analysed using STATA statistical package version 16 (StataCorp LLC). The focus portion of the study was on the assessment of the context in terms of numbers in order to reveal the amount of services load, available resources and maternal deaths. Therefore, data analysis took the form of descriptive statistics (actual numbers, percentages, average/mean) and in addition, the calculation of maternal mortality ratios. Data presentation is in the form of tables and graphs.

4.5.2 Qualitative data

4.5.2.1 Introduction

The aim of the qualitative component was obtaining deeper understanding regarding the strengths and weaknesses of the organization of maternity healthcare services from the lived experiences and perceptions of frontline healthcare workers and their immediate managers/supervisors. Secondly, the qualitative component was conducted to gather information regarding the functioning, challenges or barriers that maternity healthcare services in Gauteng were facing.

4.5.2.2 Study population

Initially the study utilised purposeful sampling techniques to recruit frontline healthcare workers and their immediate managers/supervisors representing the different levels of care, categories of healthcare workers and health districts forming the Charlotte Maxeke cluster. In purposeful sampling, individuals believed to have either knowledge or experience about the topic of interest are recruited (Benoot et al., 2005; Creswell and Plano Clark, 2011; Palinkas et al., 2015; Patton, 2014). Study participants were therefore selected and recruited from the cluster based on the belief that they had first-hand experience and deep knowledge on the functioning of maternity healthcare services and the associated challenges. This phase involved recruitment of ten study participants representing the different levels of care and categories of healthcare workers. The principal researcher listened to each digital recording within three days of the interview, writing down emerging themes and issues. Selection of subsequent study participants was guided by emerging themes and issues (Charmaz, 2014; Ligita et al, 2019). This

process called theoretical sampling informed the selection of study participant for the remaining part of the study.

Each potential participant was approached and briefed about the study. Enrolment into the study only occurred after the participant had agreed and signed informed written consent for the interviews. The interviews took place within a month of signing the informed consent on a date and time agreed between the study participants and the principal researcher. All the interviews took place at the healthcare facilities where participants were working at the time. This was the preferred site for everyone. This arrangement also provided the researchers with an opportunity to observe the study settings and their related challenges. A formal facility visit provided additional rich data to this initial observation.

4.5.2.3 Sample size

Various approaches have been suggested for sample size determination in qualitative research, depending on research question and study design (Dworkin 2012; Fugards and Potts, 2015; Vasileiou et al., 2018). Similarly, Sandelowski (1995) suggest that sample size determination depends on the purpose of the study and therefore cannot be a fixed. Based on the above, the sample size was not calculated as the aim of the study was to gather rich data from the account of healthcare workers' experiences, including their perceptions of maternity healthcare services. Data saturation was used to determine sample size. Data saturation occurs when additional interviews no longer add new information to the topic under study but instead repeat issues that were previously raised (Polit and Beck, 2017).

4.5.2.4 Techniques and tools for data collection

Qualitative data was collected using four strategies: review of the Cluster Policy Framework or CPF, semi-structured interviews, site visits and the review of the minutes of cluster morbidity and mortality (M&M) meetings.

4.5.2.4.1. Review of the CPF

CPF was reviewed in order to identify its purpose, guiding philosophy and governance structures. This process involved reading through the document looking for description of the purpose of the CPF, guiding philosophy and/principles and envisaged governance structures and processes. This information appears in the qualitative results section.

4.5.2.4.2. Interviews

Semi structured interviews were conducted using interview schedules (Appendix S). The interviews took place between the 1st of June 2019 and 29 February 2020. All the interviews were conducted by the principal researcher and in case of sub-ordinates, by the research assistant as per the recommendations from the PHD evaluation committee as part of ethics requirements. The PHD evaluation committee were of opinion that conducting interviews with subordinates would generate ethical conflict. The research assistant was a member of the Charlotte Maxeke Johannesburg Academic Hospital cluster, a Gauteng provincial representative on the National Confidential Committee Enquiry on Maternal Deaths (NCCEMD), an assessor, and like the principal researcher, a qualified Obstetrician and Gynaecology with a wealth of knowledge and experience in maternal healthcare. The interviews were piloted on four healthcare workers (medical intern, registered nurse, registrar and a consultant) who did not take part in the research to ensure clarity of the questions.

Semi-structured interviews are important tools for studies focusing on gaining in-depth information and understanding about a social phenomenon from the subjective perceptions and lived experiences of those who are/have experienced the phenomenon (Kvale and Brinkman, 2009). In addition, interviews are powerful tools to gather information pertaining to a particular context (Wisker, 2007). In deciding on the best methods of data collection, the above factors were considered and semi-structured interviews gave the greatest promise of gathering rich data that would be able to answer the research questions within the confines of the study period. Furthermore, semi-structured interviews were chosen because of the inherent ability to allow the researcher to have control over the interview process and at the same time, flexible enough to give

the research participants enough space to tell their stories (DeJonkheere and Vaughn, 2019). This would not have been possible with unstructured interviews.

4.5.2.4.3. Site visit

Field visits and observations are established tools of data collection in a qualitative research (Mirrhosseini, 2020). In order to gain a better understanding of the issues that emanated from both the quantitative component and interviews, visits to selected healthcare facilities were conducted. All hospitals belonging to the CMJAH cluster and four of the MOUs (Hillbrow, Alexander, OR Tambo and Discoverers) were visited. Site visits to the remaining MOUs could not be conducted due to time constraints however information regarding the remaining MOUs was obtained from the review of the minutes of the cluster M&M meetings (Appendix U). During the site visit, a walk through the healthcare facility was conducted followed by a briefing by the HOD or OM, and in their absence, their representative. Some of these site visits were conducted as part of the cluster site visits. During the site visits the researcher/research assistant took notes regarding their general impression of the facility, facility infrastructure and layout of the facility/unit, patient flow and challenges observed or raised through interacting with staff (Appendix T).

4.5.2.4.4. Review of the minutes of the cluster M and M meetings

Documents that provide first-hand information about an event, for example minutes from gatherings, are classified as primary sources of data (Gross, 2018). Similarly, secondary sources of data contain information from the analysis of primary documents. Minutes of the cluster M&M meetings were chosen because they provided first-hand information about the cluster, how the cluster functioned, the structure and performance of maternity services in the cluster, challenges facing the provision of maternity healthcare services, cluster interventions and outcomes, as well as reasons for failures where interventions did not yield the desired results. Furthermore, the cluster minutes provided additional information on the causes and contributing factors for maternal mortality. Cluster M&M meetings were held monthly from January 2016 till end of 2019. Minutes of the cluster

M&M meetings between 1 January 2017 to 31st December 2019 were reviewed using Appendix U as a guideline.

4.5.2.5 Data processing and analysis

4.5.2.5.1 *Data processing*

All interviews were digitally recorded and were reviewed by the principal investigator on the day of the recording. Emerging issues and topics regarding maternity services' strengths and weaknesses were written down, including topics that needed to be followed up or explored during subsequent interviews. The topics and issues were discussed with the assistant researcher to ensure consistency of the interviews. All digital recordings were stored in a password protected personal computer. A professional transcriber who signed confidential clause transcribed all the recordings and returned the transcripts to the principal investigator (Appendix M). The typed transcripts were password encrypted and stored in password protected personal computer. Similarly, notes from sites visits and original copies of the minutes of the cluster M&M were also stored in separate folders in a password protected personal computer.

4.5.2.5.2 *Data analysis*

The interview transcripts, notes from the site visits, minutes from cluster M&M and CPF were analysed using thematic analysis following Braun and Clarke's six steps (Braun and Clarke, 2006):

- Step 1: All the documents were read at least three times to obtain a general overview of the data.
- Step 2: The data was read again in order and organised into codes. The codes represented answers to the study questions.
- Step 3: The third step involved a search for themes. According to Braun and Clarke (2006), a theme can be an interesting pattern or statement that captures something important. In this case the themes generated were directed at answering the study questions and responding to the study's objectives.
- Step 4: The themes were then reviewed to make sure that they made sense, did not overlap and were not forced out of the data.

- Step 5: The 5th step involved refining the themes by combining those conveying similar messages or creating sub-themes where indicated. In order to gain better understanding of the whole, relationships or connections between the themes were explored. This process was enhanced by the use of field notes.
- Step 6: The final stage involved writing up of the themes and finally, the thesis.

This process was carried out for each document (interview transcripts, minutes from cluster M&M meetings and site visits and review of the CPF). The final themes were generated from the three sources. Information regarding the new model of healthcare was obtained from the CPF and the Cluster Referral Policy (CRP). The CPF (GDOH, 2019a) and CRP (GDOH, 2019b) provided information on the organisation of clusters, underlying philosophy, guiding principles, governance structures and referral pathways, among others. This have been discussed in previous chapter and repeated in the consolidated results and discussion section.

4.6 Quality measures

4.6.1 Different opinions, different quality criteria

There is currently no single agreed measure to assess quality of MMR studies and this is likely due the flexibility that is associated with method (Fabregues and Molina-Azorin, 2017). Because of the above, different approaches for the assessment of quality of MMR have been suggested. These include the use of general and method-specific quality criteria (qualitative or qualitative) or quality frameworks (Bryman, 2014; Frabregues and Molina-Azorin, 2017; Lincoln and Guba, 1985, 2018; O’Cathan and Murphy, 2008).

4.6.2 General research quality criteria

According to Fabregues and Molina-Azorin (2017) studies can be judged to have satisfied the general quality criteria under the following conditions:

- The philosophical assumption informing the study has been made clear
- There is congruence between the philosophical assumption, study design, research questions, methods and tools of data collection and analysis

Detailed discussion regarding the researcher's philosophical assumption and rationale for the MMR can be found in opening sections of this chapter. Similarly, detailed account of the different component of the study including the relationships between the components and the philosophical assumption has been provided. Based on the above it can be argued that the study meets the general quality criteria proposed by Fabrigues and Molina-Azorin (2017).

4.6.3 Method-specific criteria

Validity and reliability are the common methods specific measures used to assess quality in research. According to Heale and Twycross (2015), validity refers to the accuracy of measurement while reliability is concerned with "*the degree to which the test will yield similar results*" (consistency), should the measurement be repeated under similar conditions. Validity and reliability are synonymous with quantitative research while rigour is the corresponding term for quality in qualitative research (Heale and Twycross, 2015; Kito et. al., 2008; Morse et al., 2002).

4.6.3.1 Quantitative

The qualitative component was directed at assessing the context, input, and product components of the CIPP model using numerical data that is routinely collected by the healthcare institutions in the CMJAH cluster as well as data that was only collected for the purpose of the study. Therefore, the quality of the data and results of the analysis was dependant on the quality of the databases from which the data was sourced and the accuracy of the information that was provided by participating healthcare facilities. Efforts were made to ensure that the data that was collected accurate as far as practically possible. This process involved comparing the different data sources and addressing any discrepancy with the source institution where such existed. In case of discrepancy between the DHIS and data supplied by individual institutions, the data supplied by the latter was considered to be the most accurate as this data was collected on a monthly basis and presented to the cluster during the monthly cluster M and M meetings. The above interventions improved the validity of the study's findings. There is generally high turnover of staff in healthcare facilities as people move in and out of the public sector for different reasons. It is possible for the data presented in this thesis to have changed

considerable since its collection. Despite the above, it is envisaged that another study conducted in the same study settings, asking the same questions and using the same data sources would, in all probability, arrive at the same findings in terms of the calculations. This property of the data confirms that the study's findings are reliable. The study utilised simple descriptive statistics that can be easily verified and do not require knowledge of complex statistical measures. This makes the study accessible and comprehensible to people without any background in biostatistics.

4.6.3.2 Qualitative

Qualitative studies rely on rigour as measure of quality instead of validity and reliability (Anderson, 2017; Kito et al., 2008; Morse et al., 2002; Shenton, 2004; Tong et al 2007). While there are many definitions for rigor, it is best to think of rigor in terms of alignment between the research question, design and methodology (Morse et al., 2002). Four criteria; credibility, conformability, dependability and transferability are therefore used to measure the rigor of qualitative research (Morse et al., 2002; Lincoln and Guba, 1985).

According to Cypress (2017) credibility is the extent to which the research findings are able reflect the true state of affairs. Numerous approaches have been suggested to ensure credibility in qualitative research (Kaminski and Pitney, 2004; Kito et al., 2008; Lincoln and Guba, 1985; Morse et al., 2002). Member checking and justification of the choice of the research design, method and tools for data collection and analysis are among the most commonly used approaches to ensure credibility in qualitative research (Kito et al., 2008; Lincoln and Guba, 1985; Morse et al., 2002; Treharne and Riggs, 2015). Conformability is established when the research results can be traced back into the data and not forced into the data because of the researcher's bias (Stenfors et al., 2020). Dependability is concerned with the extent to which the research findings could be reproduced in different contexts under similar circumstances (Moon et al., 2016; Lincoln and Guba, 1985; Treharne and Riggs, 2015). This is made possible through detailed description of the research context, process and tools of data collection and analysis, including the rationale behind choices made. Last but not least, transferability refers to the extent to which the result of the study is applicable in a different context (Treharne

and Riggs, 2015). This is achieved through a deep description of the research process and findings (Lincoln and Guba, 1985; Stenfors et.al., 2020; Treharne and Riggs, 2015).

The following steps were taken to satisfy quality requirements for the qualitative component:

- Detailed description of the research design, process, and data collection tools and analysis, including justification of the choices made was provided.
- All digital recordings were transcribed by a professional transcriber after signing a confidential clause (Appendix M).
- The triangulation of data from multiple sources strengthened the accuracy of the findings in addition to providing better insight into the research problem.
- Both the principal and assistant researchers are qualified obstetricians and gynaecologists working in the field of maternal health. Both have served in government structures that were responsible for developing strategies directed at improving maternal health. In most cases the above involved detailed analysis of maternal health services including working with WHO.
- Furthermore, the researchers have served as assessors for maternal deaths for the province on different occasions.
- The assistant researcher was brought in on recommendation by the PhD assessment Committee to conduct interviews with sub-ordinates of the principal researcher to reduce bias.
- Because these researchers are also part of the frontline health workers, the principal researcher had to make considerable effort to bracket his own experiences and views regarding maternity healthcare services. All themes are supported with quotations and quantitative data was cross checked with DHIS and participating institutions to ensure accuracy of the findings. Analysis of quantitative data was achieved by using simple descriptive statistics that does not require deep knowledge of statistical measures therefore making it easy to verify the calculations and conclusions that have been drawn.
- The study's main findings were shared with six people (three HODs, intern, registrar and midwife) working in cluster hospitals. All confirmed that the findings from the study were a true reflection of the experiences of maternity services in the

CMJAH cluster as well as the province. All the six individuals either worked or trained healthcare institutions in that fell outside the cluster but in Gauteng.

- Lastly, the study's main findings are congruent with other studies on maternity and general healthcare services in South Africa and other African countries. Based on the above, an argument can be made that the study's findings are not only applicable in Gauteng Province but other provinces in South Africa as well as LMICs.

4.6.3.2.1 Quality frameworks

Julia Brannen (Bryman, 2014) and the GRAMMS (O'Cathain et. al., 2008) quality criteria frameworks are worthy of brief discussion. Brannen's framework is made up of 6 quality criteria:

- There is clear rationale as to why the MMR design was chosen.
- The author is explicit regarding the underlying philosophical assumptions that informed the choice of MMR study design.
- There is congruence between the study design, research questions, research objectives, tools, and data collection techniques and analysis.
- The quantitative and qualitative components were implemented in accordance with agreed guidelines governing the conduct of the respective study designs.
- There is transparency in terms of the timing of the quantitative and qualitative components.
- The study provided justification on the need for the integration of quantitative and qualitative data and how the integration was achieved.

Instead of Brannen's 6 criteria, GRAMMS (O'Cathain et al, 2008), suggest 5 criteria for the evaluation of quality of MMR studies:

- The justification for the choosing the MMR design is explicit.
- Each component (quantitative and qualitative) has been well described in terms of sampling, tools, and data collection techniques and analysis.

- There is clear description in terms of the purpose, timing of collection and the role played by the quantitative and qualitative data in answering the research questions/objectives.
- Point of integration is clear
- The author(s) have described the lessons learnt and insight gained in choosing MMR design.

The study fulfils both Brannen's (Bryman, 2014) and the GRAMMS' (O'Cathain et al., 2008) quality criteria in addition to general and method specific criteria. Furthermore:

- MMR design has proven useful for studies focusing on complex healthcare system topics (Curry et al., 2013; O'Cathain et al., 2007). The study drew on the relative strengths of quantitative and qualitative research. The combination of the two approaches provided better illumination of the research phenomenon under investigation.
- The study is informed by a pragmatic paradigm, a research paradigm that is commonly associated with an MMR design. Pragmatic researchers are solution orientated and their main focus is on how best to answer a research problem.
- The different components of the study (quantitative and qualitative) are independently described in terms of data collection and analysis, sequencing of the quantitative and qualitative components, including point of integration.
- Despite all the advantages, the use of MMR proved to be more complex than anticipated, was time and resource intensive. Integrating the two components was not an easy task. However, at the end, the decision to use a mixed method research design proved to be a wise choice as all different component came together and corroborated to answer the research questions.

4.7 Ethical considerations

The following steps were taken to adhere to the ethics requirements (Appendix A):

- The study was registered with the National Department of Health research data base (NHRD GP_201901-039 and NHRD-2019-042)
- The study received ethical approval from the Human Research Ethics Committee (HREC) of the University of the Free state (Appendix A) and Gauteng Provincial

Research Ethics Committee (GPREC). The latter delegated the responsibility for ethical approval to the respective districts and hospital research ethics committees (Appendix B to L).

- The heads of participating institutions, Head of Department of Gauteng Health and the Academic Head of the Department of Obstetrics and Gynaecology at the University of the Free State (Appendix N) granted permission to conduct of the study.
- All study participants signed informed consent confirming voluntary participation and their right to withdraw at any time during the research process (Appendix P and Q).
- Study participants granted written permission for the digital recording and were assured of confidentiality (Appendix Q).
- All data utilised in the study was anonymised to ensure confidentiality and stored in a password protected personal computer.

4.8 Chapter summary

In this chapter, a detailed description on the research design, research process, data collection tools and analysis, including underlying assumptions and rationale for the choice of convergent MMR design were presented. Furthermore, the study outlined the steps taken to ensure validity, reliability and adherence to ethical requirements. In chapter 5 the results of quantitative are presented, followed with qualitative results following in chapter 6.

CHAPTER 5: QUANTITATIVE STUDY RESULTS

5.1 Introduction: organisation of healthcare services

Healthcare services in Gauteng are organised in the form of clusters, the cluster model was introduced in 2016 and signed in to policy in 2019 (GDOH, 2019). Details of the cluster arrangement is contained in the Cluster Framework Policy or CPF (GDOH, 2019). There are four clusters in Gauteng: two in the North, Dr George Mukhari Academic Hospital (DGMAH) and Steve Biko Academic Hospital (SBAH) and two in the South, Christ Hani Baragwanath Academic Hospital (CHBAH) and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), popularly known as Charlotte Maxeke cluster. All the central hospitals and consequently the clusters are named after political stalwarts.

5.2 Charlotte Maxeke cluster

The CMJAH cluster covers three health districts: City of Ekurhuleni, City of Johannesburg, and the West Rand District. The cluster is formed by a network of approximately 38 health facilities comprising of: 15 PHC clinics; 11 CHCs/MOUs (11th established after the study commenced and therefore does not form part of this study); four district hospitals (DHs); six regional hospitals (RHs); one provincial tertiary hospital (PTH) that does not provide maternity services and one central hospital. These health facilities are spread over the three health districts which also happened to be the geographic districts of Gauteng Provincial Government.

The remaining facilities within the City of Ekurhuleni and the City of Johannesburg belong to the Chris Hani Baragwanath Academic Hospital, popularly known as CHBAH cluster (Table 5.1). Table 5.2 is a summary the healthcare facilities that fall under CMJAH cluster. With reference to the Charlotte Maxeke cluster, the following observations were made:

- The City of Johannesburg had the highest number of CHCs/MOUs and the remaining two remaining districts, equal numbers.

- The City of Ekurhuleni had the highest number of RHs followed by the City of Johannesburg.
- There was no provincial tertiary hospital (PTH) that provided maternity and child healthcare services within the cluster. This function was provided by CMJAH (a central hospital) and to some extent, Rahima Moosa Mother and Child Hospital (RMMCH), a regional hospital. RMMCH was a stone throw distance from the PTH.
- Due to the lack of a district hospital in the proximity of Hillbrow (Hillbrow was previously a district hospital but converted to a CHC during the provincial public health system reform), Hillbrow MOUs and its feeder clinics referred all the patients who needed care beyond that which was provided by the MOUs to CMJAH. This referral also included patients who required uterine evacuations for retained products of conceptions and caesarean sections that could have been done at a district hospital.
- South Rand District Hospital also directly referred patients to CMJAH. Before 2020, SRH did not perform caesarean sections and evacuations on weekends and instead referred such patients to CMJAH citing lack of staff. The same is still happening but less frequently so.
- Therefore, CMJAH provided a combination of district, regional and tertiary/central hospital services in the cluster during the three-year study period despite its status as a central hospital.
- This situation came as a result of inadequate healthcare facilities and also lack of capacity in the existing healthcare facilities in the cluster and also Gauteng province as a whole.

Table 5. 1: Number of healthcare facilities providing maternity services in the CMJAH cluster

HEALTHCARE FACILITIES	CITY OF EKURHULENI	CITY OF JOHANNESBURG	WEST RAND DISTRICT
MOUs	3	5	3
DHs	1	1 (1*)	2
RHs	3 (1*)	2 (1*)	1
PTH	0(1**)	1 (no maternity services)	0
CMJAH	0	1 (1*)	0

**Health facilities belonging to CHBAH cluster, **Health facilities belonging to SBAH cluster*

Table 5. 2: Names of health care facilities belonging to the CMJAH Cluster

	CITY OF EKURHULENI	CITY OF JOHANNESBURG	WEST RAND DISTRICT
Central/Tertiary hospital	None	CMJAH	None
Provincial Tertiary Hospital	Tembisa Provincial Hospital but does not belong to CMJAH cluster	Hellen Joseph (No mother and child services)	None
Regional Hospitals	Far East Rand Hospital (FERH) Pholosong (PH) Tambo Memorial Hospital (TMH)	Edenvale Hospital (EH) Rahima Moosa Mother and Child Hospital (RMMCH)	Leratong Hospital (LH)
District Hospitals	Bertha Gxowa(BGH)	South Rand Hospital (SRH)	Carletonville Hospital (CH) Dr Yusuf Dadoo Hospital (DYDH)
MOUs	Kwa Thema MOU Nokuthela Ngwenya MOU Phillip Moyo MOU	Alexander MOU Discovers MOU Hillbrow MOU OR Tambo MOU Ebony Park (new, not included)	Bekkersdal MOU Khutsong MOU Mohlakeng MOU

5.3 MOUs and hospitals

5.3.1 City of Ekurhuleni

There were three MOUs in the City of Ekurhuleni that belonged to the CMJAH cluster. Two of MOUs were referring patients to Pholosong Hospital (PH) and one to the Far East Rand hospital (FERH). However, due to the over-crowding at Thelle Mogoerane, the City of Ekurhuleni arranged for Ramokonopi MOU from the CHBAH cluster to refer patients to the Far East Rand, Pholosong, Tambo Memorial and Thelle Mogoerane (Thelle Mogoerane being the only regional hospital belonging to CHBAH) hospitals on a rotational basis. All the MOUs were more than 5km (average 15,2km, Range 7.5-26.9km) from the referral hospitals. Among the MOUs, Phillip Moyo was the furthest from its referral hospital (27km). Similarly, the average traveling time between the MOUs and referral hospitals was 18.3 minutes. Table 5.3 summarises the above.

Table 5. 3: Estimated distances and estimated traveling time from MOUs to referral hospitals in the City of Ekurhuleni

MOU	REFERRAL HOSPITAL	DISTANCE (Km)	TRAVELLING TIME (Min.)
Kwathema	Pholosong	7.5	12
Nokuthela Ngwenya	Pholosong	11.3	18
Phillip Moyo	Far East Rand	26.9	25
Average		15.2	18.3

5.3.2 City of Johannesburg

Distances and traveling time between the CHCs/MOUs and referral hospitals in City of Johannesburg are summarised in Table 5.4. The average distance and traveling time between MOUs and referral hospitals in the City of Johannesburg were 14.3 km (range 2.2-38km) and 16 (range 6-37) minutes, respectively. Two of the MOUs were less than 5kms and 6 minutes traveling time from their referral hospitals. The remaining two MOUs were 12.3km and 38kms ,15 minutes and 37 minutes from their referral hospital,

respectively. OR Tambo MOU was the furthest from its referral hospital in terms of distance and traveling time, followed by Discoverers MOU. The two MOUs were referring patients to RMMCH, which happened to be the busiest regional hospital in the cluster. Similarly, OR Tambo MOU located in Diepsloot which is an informal settlement, was among the busiest MOUs in the cluster. One of the MOUs that refers to RMMCH (Discoverers) was 11.3km and 14 minutes from Leratong Hospital (LH) however, this MOU belonged to the City of Johannesburg and therefore was referring patients to RMMCH despite its proximity to Leratong. Discoverers MOU was at, a distance of 12.3km and 15 minutes traveling time by road from RMMCH. As it would appear later, Discoverers MOU was one of the less busy MOU and therefore the MOU could as have assisted in relieving pressure from Leratong Regional Hospital.

Table 5. 4: Distance and traveling time from MOU to the referral hospital in the City of Johannesburg

MOU	REFERRAL HOSPITAL	DISTANCE (Km)	TRAVELLING TIME (Min.)
Alexander	EH	4.6	6
Hillbrow	CMJAH	2.2	6
Discoverers	RMMCH	12.3	15
OR Tambo	RMMCH	38	37
Average		14.3	16

5.3.3 West Rand District

There were equally three MOU that belonged to the CMJAH cluster in the West Rand District. Two of the MOUs referred to LH which was the only regional hospital in the district (LH was also a referral hospital for two busy DHs, will be discussed later). The average distance and travelling time were 16.4km (range 11.1-21) and 18 (range12-23) minutes respectively. None of the MOUs were within 5km travelling distance from Leratong. Bekkersdal MOU was the furthest in terms of distance and travelling time to LH compared to the other two MOUs (See Table 5.5).

Table 5. 5: Distance and traveling time from MOU to the referral hospital in the West Rand district.

MOU	REFERRAL HOSPITAL	DISTANCE (Km)	TRAVELLING TIME (Min.)
Bekkersdal	LH	21.7	23
Khutsong	Carletonville (CH)	11.1	12
Mohlakeng	LH	16.4	19
Average		16.4	18

5.3.4 Distances and travelling times between MOUs and referral hospitals in the three health districts

When the three health districts are compared, the average distances and travelling times between MOUs and referral hospitals in the City of Ekurhuleni, City of Johannesburg and the West Rand district were comparable despite the variation between individual MOUs and referral hospitals (See Table 5.6.) This finding suggests that distances between institutions is unlikely to be a major contributor should the differential health outcomes between the healthcare districts.

Table 5. 6: Average distance and travelling time between MOU and referral hospitals in the three health districts

HEALTH DISTRICT	MEAN DISTANCE (Km)	MEAN TRAVELLING TIME (Min.)
City of Ekurhuleni	15.2	18.3
City of Johannesburg	14.3	16
West Rand	16.4	18

5.4 Referrals from district hospitals to the next level of care

Unlike MOUs, referrals from DHs to the next level of care did not follow provincial district/municipal boundaries. The average distance between district hospitals and the next referral level was 21.2 km with a similar average traveling time. However, Carletonville hospital (CH) was 51km and 43 minutes from LH (Carletonville was referring to LH). Carletonville is an old mining area which continues with some level of mining activities to this day. Similarly, all district hospitals with the exception of CH and Dr Yusuf Dadoo Hospital (DYDH), were within a 30 minutes' drive from CMJAH in case of tertiary referrals. When compared to other DHs, Carletonville hospital was the furthest from both LH and CMJAH. This impacted referral in terms of emergencies, as will become apparent under discussion on maternal mortality. Table 5.7 is a summary of the above.

Table 5. 7: Estimated distance and travelling between district hospitals and next level of care

DISTRICT HOSPITAL	REFERRAL HOSPITAL	DISTANCE (Km)	TRAVELLING TIME (Min.)	DISTANCE TO CMJAH	TRAVELLING TIME TO CMJAH (Min.)
Bertha Gxowa	Tambo Memorial	9.3	14	32km	22
Carletonville	Leratong	51.3	43	80km	60
South Rand	CMJAH	13	16	13.0km	18
Yusuf Dadoo	Leratong	11.4	13	31km	52
Average		21.2	21.5	39km	38

5.5 Referrals from regional hospitals to CMJAH

All patients who needed tertiary care from MOUs, DHs and RHs were referred to CMJAH. The average distance and travelling time between RHs and CMJAH were 31.5km (range 8.4-58km) and 30 minutes (range 18-46 minutes) respectively (Table 5.8). Pholosong and Far East Rand Hospitals, both located in the City of Ekurhuleni were the furthest in terms

of travelling distance and time from CMJAH, followed by Leratong hospital. RMMCH and Edenvale hospitals were the closest (within 8.4km, 12.2 km, 12 minutes and 12.2 minutes from CMJAH respectively).

Table 5. 8: Estimated distance and travelling time between regional hospitals and CMJAH

REGIONAL HOSPITAL	DISTANCE (Km)	TRAVELLING TIME (Min.)
Edenvale	12.2	18
Far East	58.8	44
Leratong	30	32
Pholosong	51.6	46
RMMCH	8.4	12
Tambo Memorial	28.1	30
Average	31.5	30

5.6 Summary of referrals between healthcare facilities

Healthcare facilities across the three health districts in the CMJAH cluster were on average, equivalent in terms of number of facilities, distances, and traveling time. However, there were intra-district differences in terms of distances and traveling time between referring and referral healthcare facilities. This finding is likely a reflection of the apartheid-era spatial planning which was more biased toward White only areas and also the failure of the new political dispensation to correct the challenges of the past more than 25 years after into the democracy.

5.7 Healthcare resources

5.7.1 Maternal beds

The number and distribution of maternity beds in the cluster are summarised in Table 5.9. Together, RHs contributed 39% of the total maternity beds in the cluster, followed by district hospitals and MOUs at 31% and 17.4%, respectively. CMJAH contributed the

remaining 13%. Together, district hospitals and MOUs (district healthcare services) provided just below half (48.4%) of the total number of available maternity beds in the cluster. MOUs and district hospital combined had 83 more beds compared to regional hospitals. This is an important observation considering that regional hospitals were responsible for 70% of the total cluster deliveries (discussed later). The least number of beds (13%) were in CMJAH. This hospital provided most of the tertiary healthcare services in the cluster. There were no dedicated obstetric critical care beds and dedicated obstetric high care beds only contributed 1.1% of the total maternity beds in the cluster. All women who needed critical beds had to compete for general critical beds which were in high demand.

Table 5. 9: Number of maternity beds in the CMJAH cluster

BEDS	TERTIARY/ CENTRAL HOSPITALS	REGIONAL HOSPITALS	DISTRICT HOSPITALS	MOUs	% OF TOTAL
Dedicated maternity admissions	10	8	5	12	4.1
Delivery/ Labour	18	67	62	32	21.0
Labour/ Obstetric high care	4	6	0	0	1.1
Post-natal (<i>post CS/NVD</i>)	58	144	117	73	46.1
Antenatal admission	20	104	80	31	27.6
Obstetrics Critical Care	0	0	0	0	0
% of Total	13	38.7	31	17.4	100

5.7.2 Healthcare workers

Table 5.10 provides a summary on the distribution of healthcare workers in the cluster. Interns were not included since this category of healthcare workers is not part of the permanent staff establishment in the health system. RHs had more than half (57.3%) of the total staff complement for the cluster followed by CMJAH and DHs at 17.2% and 14.5% respectively. Similarly, RHs had 39% of the total cluster maternity beds and were also responsible for 70% of the total deliveries in the cluster. Only 11.1% of the total cluster staff complement worked at the MOUs. MOUs and DHs combined had just over a quarter (25.5%) of the total cluster staff complement. Together with DHs, MOUs make up district health maternity services. Therefore, the number of staff across the different levels appeared to be in line with the number of beds and service load.

In terms of the healthcare worker category, professional nurses with midwifery accounted for 28.8% of the total healthcare workforce, followed by enrolled nursing assistants and enrolled nurses at 20.2% and 17.3%. Advanced Midwives contributed only 12% of the total number of healthcare workers in the cluster. Majority of the Advanced Midwives were at RHs (44.5%) followed by (27.5%) hospitals. District hospitals had the least number (8.5%) of advanced midwives. In the case of MOUs, professional nurses with midwifery were the highest group (44.9%) followed by advanced midwives (21.1%). Medical officers and registrars contributed 5.4% of the total cluster workforce, while specialists and professional nurses without midwifery contributed 1.9 % and 3.6 % of the total number of healthcare workers in cluster respectively.

A number of approaches have been used to measure staffing needs. These include patient-nurse ratios, patient load, professional judgement, patient profile, among others (Griffiths et al., 2020). The number of deliveries, Patient-staff ratio and professional opinion by healthcare workers were used to estimate service load. The patient-staff ratio was estimated by dividing the number of deliveries over a three-year period by the number of staff. This calculation did not take into account annual and sick leave including the fact that some of the staff worked in more than one area (e.g Midwife working in the MOU are responsible for maternity admissions, deliveries, immunisation, family planning and postnatal care. Assuming that the advanced midwives only worked in the labour ward,

the ratio of patient to advanced midwives would have been 1:1 (based on 257234 deliveries during the 3-year study period). Using the same formula, the ratio would have been 1:4 and 1:3 for specialists and medical officers/registrars respectively. In practice, the above is unlikely to be true as nurses and doctors cover more than one service area. The distribution of the different cadre of healthcare workers was not the same across similar levels of care and across healthcare districts. It was therefore important to gather healthcare workers' opinions (discussed in the following chapter) about services load in order to gain insight on the challenges facing maternity services.

Table 5. 10: Staff distribution in the Charlotte Cluster

STAFF CATEGORY	CMJAH	REGIONAL HOSPITALS	DISTRICT HOSPITALS	MOUS	% OF TOTAL
Advanced Midwives	55	89	17	39	12
Professional nurses with midwifery	82	217	100	83	28.8
Professional nurses without midwifery	0	47	0	13	3.59
Enrolled nurses	31	211	40	7	17.3
Enrolled nursing assistants	42	235	49	12	20.2
Community Service Nurses	0	21	0	5	1.55
Specialists	11	18	0	3	1.91
Medical Officers/ Registrars	22	52	16	0	5.38
Phlebotomists	1	37	0	0	2.27
Ward attendants	13	9	0	0	1.32
Clerks	1	23	5	2	1.85
Cleaners	29	Not supplied*	15	21	3.89
% of Total	17.2	57.3	14.5	11.1	100

***Note:** Health facilities were asked to indicate the number of the different categories of healthcare workers that were assigned exclusively to obstetrics (except for medical officers and specialists. The two categories of healthcare workers were responsible for both obstetrics and gynaecological services). RHs did not supply data on cleaners. Some indicated that the cleaners were shared with other departments or were also responsible for gynae services.

5.7.3 Staff distribution in regional hospitals

As previously stated, the highest number of staff was in RHs however when RHs were compared, RMMCH had just below half (48%) of the total number of staff employed in RHs followed by FERH (13.6%) and TMH (12.3%). Pholosong and Edenvale hospitals had the least number of staff among RHs at 8.7% and 7.4%, respectively (Table 5.11).

In terms of professional groups, majority of the staff belonged to the category of enrolled nursing assistants (23.6%) followed by professional nurses with midwifery (21.8%) and enrolled nurses (21.2%). Advanced midwives, medical officers, and specialists contributed 8.95%, 5.23%, and 1.81% of the total staff complement in RHs, respectively.

Table 5. 11: Staffing in cluster regional hospitals

STAFF CATEGORY	LH	EH	RMMCH	PH	TMH	FERH	TOTAL	% OF TOTAL
Advanced Midwives	17	10	17	24	0	21	89	8.95
Professional nurses with midwifery	41	30	38	24	50	34	217	21.8
Professional nurses without midwifery	0	1	38	0	0	8	47	5.5
Enrolled nurses	5	5	162	7	19	13	211	21.2
Enrolled nursing assistants	10	8	172	6	18	21	235	23.6
Community Service nurses	2	0	0	0	5	14	21	2.11
Specialists	2	2	9	2	2	1	18	1.81
Medical Officers/ registrars	12	7	4	7	13	9	52	5.23
Clerks	41	4	9	7	4	3	68	6.84
Phlebotomist	5	4	8	6	7	6	36	3.82
Total	135	71	457	83	118	130	994	100
% of Total	14.1	7.4	47.7	8.65	12.3	13.6	100	100

5.7.4 Staff distribution in district hospitals

The distribution of healthcare workers in DHs is shown in Table 5.12. DYDH and BGH had the highest number of staff in the DHs group at 38% and 33% respectively. SRH had 17% of the total DHs staff complement and CH the least number at 12%. In terms of staff category, professional nurses with midwifery were in the majority (41.3%) followed by enrolled nursing assistants (20.3%) and enrolled nurses (16.2%). Advanced midwives, medical officers and cleaners contributed 7%, 6.6% and 6.2% of the total number of DHs staff complement in the cluster. The number of support staff was also low as was the case in other levels of care (see previous tables).

Table 5. 12: Staff distribution in cluster district hospitals

STAFF CATEGORY	CH	DYDH	BGH	SRH	TOTAL	% OF TOTAL
Advanced Midwives	3	0	8	6	17	7.02
Professional nurses with midwifery	17	41	27	15	100	41.3
Professional nurses without midwifery	0	0	0	0	0	0
Enrolled nurses	0	19	14	7	40	16.5
Enrolled nursing assistants	0	27	16	6	49	20.3
Medical Officers	3	4	7	2	16	6.61
Clerks	1	0	4	0	5	2.06
Cleaners	5	0	4	6	15	6.19
Total	29	91	80	42	242	100
% of Total	12	37.6	33.1	17.4	100	100

5.7.5 Staff distribution in cluster MOUs

The highest number of staff among MOUs in the cluster was at Hillbrow (20.5%) followed by Phillip Moyo (12.4%) and Discovers (11.9%). Kwathema (9.7%) and Alexander (8.7) occupied 4th and 5th places respectively. The remaining three MOUs, Mohlakeng, Khutsong and Bekkersdal had 7.2%, 6.5% and 5.9 % of the total cluster MOU staff pool

respectively. Professional nurses with midwifery were in the majority (45%), followed by advanced midwives (21.1%). Philip Moyo (25.6%), Nokuthela Ngwenya (23.1%), and Kwa Thema (17.9%) had the highest concentration of advanced Midwives compared to the rest of the MOUs. All three MOUs belong to the City of Ekurhuleni. Despite the high delivery load, the number of advanced midwives in the MOUs belonging to the City of Johannesburg was less than the City of Ekurhuleni. MOUs in the City of Johannesburg and the West Rand District had more professional nurses with midwifery than advanced midwives. This information is summarised in Table 5.13.

Table 5.13 Distribution of staff in cluster MOUs

STAFF CATEGOR Y	HILLBR OW	DISCO VERE RS	BEKKE RSDAL	MOHLAK ENG	KHUT SONG	KWA THEMA	PHILLI P MOYO	NOKUT HELA NGWEN YA	OR TAMBO	ALEXA NDER	TOT AL	% OF TOTA L
Advanced Midwives	4	3	0	0	0	7	10	9	2	4	39	21.08
Professional nurses with midwifery	15	7	11	12	12	5	0	0	9	12	83	44.9
Professional nurses without midwifery	1	0	0	0	0	2	8	2	0	0	13	7.03
Enrolled nurses	1	4	0	0	0	0	1	0	1	0	7	3.78
Enrolled nursing assistants	1	4	0	0	0	1	1	4	1	0	12	6.49
Community Service Nurses	0	0	0	0	0	3	2	0	0	0	5	2.70
Specialists (DCST)	1			1			1				3	1.62
Clerks	2	0	0	0	0	0	0	0	0	0	2	1.08
Cleaners	13	4	0	0	0	0	0	0	4	0	21	11.4
Total	38	22	11	13	12	18	23	15	17	16	185	100
% of Total	20.5	11.9	5.94	7.02	6.5	9.73	12.4	8.11	9.19	8.65	100	100

5.7.6 Emergency transport

There were 34 functional obstetric ambulances for the entire Gauteng Province. Nineteen (19) of the ambulances were shared by health facilities belonging to CMJAH and CHBAH cluster or simply stated, Gauteng South Region (Table 5.14).

Table 5. 13: Obstetric ambulances

HEALTH DISTRICT	NUMBER OF AMBULANCES
City of Johannesburg	09
City of Ekurhuleni	05
Sedibeng	04
City of Tshwane	11
West Rand	05
Total	34

Only the City of Johannesburg was able to provide data for interfacility transfers, however this data was for 2020 and falls outside the study period. The data has been included to shed some light on emergency transfers. In total, 11559 interfacility obstetric patient transfers took place between January and December 2020 in the City of Johannesburg (Table 5.15). The highest numbers of transfers were from Hillbrow MOU to CMJAH, OR Tambo and Discoverers MOUs to RMMCH and Ebony MOU which transfers to multiple sites (Ebony MOU only opened in 2020 and therefore fell outside the study period). The transfers were not necessarily for tertiary services but for indications like caesarean sections in poor progress or foetal distress which could have been managed at a district hospital. But because of lack of district hospitals in the region, MOUs transferred patients to higher levels of care, a finding which out of alignment the referral policy (GDOH, 2019b). Similarly, South Rand Hospital could not perform caesarean sections during weekends because of a lack of staff. Instead, the hospital referred all caesarean sections

during the weekend to CMJAH. Similar data was not available for the City of Ekurhuleni and the West Rand District.

Table 5. 14: Emergency obstetric ambulances transfers in the City of Johannesburg

FACILITY	TOTAL NUMBER OF TRANSFERS	% OF TOTAL
Hillbrow MOU	2563	22.2
Selby clinic	103	0.9
South rand Hospital	255	2.2
Alexander MOU	618	5.3
Edenvale Hospital	494	4.3
Ebony Park MOU	2311	20.0
Midrand clinic	388	3.4
OR Tambo MOU	2460	21.3
Witkoppen clinic	584	5.0
Discovery MOU	1783	15.4
Total	11559	100

5.7.7 Termination of pregnancy services

The Choice of Termination of Pregnancy ACT (CTOP) was introduced in South Africa in 1996 as a strategy to curb the high rate of maternal mortality from illegal abortions (RSA, 1996b). The Act makes provision for the termination of pregnancy by choice up to 12 weeks and between 12 and 20 weeks, if continuing with the pregnancy poses a danger to either the mother or foetus. None of the MOUs/CHCs in the City of Ekurhuleni provided CTOP services. Among the City of Johannesburg MOUs, only Hillbrow provided first-trimester CTOP. However, other CHCs/MOUs belonging to the City of Johannesburg, but outside the CMJAH cluster were performing first trimester CTOP. Similarly, no

MOU/CHC in the West Rand District was performing first-trimester CTOP during the study period. The above situation remained the same in 2021.

All the district hospitals belonging to the Charlotte Maxeke cluster offered first trimester CTOP. Among central and regional hospitals, only three hospitals provided first-trimester CTOP. Leratong Hospital was the only hospital that was providing both first and second-trimester CTOP services in the cluster. RMMCH did not have an official termination of pregnancy service. The reason given was that the nursing staff were not comfortable supporting CTOP services in this hospital. To overcome this barrier, the Foetal Medicine Unit staff included CTOP among medically indicated foetal terminations whenever they were able to do so. (Table 5.16 is a summary of the above).

Table 5. 16: Termination of pregnancy services in CMJAH and regional hospitals

	CMJAH	EH	FERH	LH	PH	RMCH	TMH
First trimester	Yes	No	No	Yes	No	Yes	No
Second trimester	No	No	No	Yes	No	No	No

5.8 Deliveries statistics and maternal mortality

There were weekly morbidity and mortality (M&M) meetings in all cluster hospitals. There was also an obligatory monthly cluster M&Ms meeting. The M&M meetings involved detailed discussions of maternal and neonatal deaths including causes and contributing factors. After each M&M meeting, each facility put together a quality improvement plan (QIP) on the issues that were identified during the M& M meetings. Each facility would then report share the plan with the cluster in subsequent meetings including successes and failures. There were also regular management meetings (attended by HODs and DCST) after every cluster M & M meeting. The focus of the management meetings was to discuss management, clinical governance and leadership related issues.

5.8.1 Deliveries and maternal deaths in the CMJAH Cluster in 2017

5.8.1.1 Central Hospital

There were 8900 deliveries in CMJAH in 2017, 48% of which were caesarean sections (Table 5.17). CMJAH was the only tertiary referral hospital for all the healthcare facilities in the cluster. In addition, the hospital received tertiary care referrals from outside the cluster and the province.

Table 5. 17: Deliveries and maternal deaths in CMJAH hospital in 2017

	CMJAH
Total number of deliveries	8910
Live births	8764
Maternal deaths	15
iMMR	171.2
Deliveries per month	742.5
Deliveries per day	27.5
CS rate	48%

There were 15 maternal deaths, 40% of which were among non-nationals. The leading cause of maternal deaths in 2017 was complications of hypertensive disorders in pregnancy (HPT), followed by medical and surgical (M&S) disorders, pregnancy related sepsis (PRS), (NPRI) and obstetric haemorrhage (OH) (Table 5.18). There were two cases of pulmonary embolism (PE) in the medical and surgical (M&S) group. Pregnancy related sepsis (PRS) was the third cause, and only one case of obstetric haemorrhage (OH) was reported and one case unsafe/illegal abortion which formed part of the pregnancy related sepsis.

Lack of critical care beds, late presentation, delayed and sub-standard management, and delayed in referring patients, were among the most common avoidable factors that associated with the maternal deaths. There was one case of OH which occurred following

induction of labour for postdates, where the doctor involved (a junior registrar) failed to appreciate the severity of the patient's condition resulting in the delay in appropriate management of haemorrhage. Rotation of registrars in the academic circuit was not based on seniority hence junior registrars often found themselves managing conditions beyond their capability sometimes without senior supervision. All the patients who died as result of complications of hypertension died either due to irreversible state of the disease processes on arrival or because of lack of critical care beds.

Table 5. 15: Cause of maternal deaths in CMJAH in 2017

CAUSE (n = 15)	TOTAL	% OF THE TOTAL
HPT	5	33.3
M&S	4	26.7
PRS	3	20
NPRI	2	13.3
OH	1	6.7
Total	15	100

5.8.1.2 Regional hospitals

RMMCH had the highest number of deliveries and specialists, low caesarean section rate and the lowest iMMR among the regional hospitals. This is likely a reflection of the high numbers of low-risk patients cared for at this institution (the hospital is situated in an area with no district hospital and is a direct referral of two MOUs (Discoverers and OR Tambo). FERH was the second-highest in terms of deliveries. The mean CS rate among regional hospitals was 33.1% and PH had the highest CS rate (49%). The high CS rate is a concern given the number of maternal deaths due to CS-related OH (discussed in the next section). Table 5.19 is a summarises the above.

Table 5. 19: Deliveries and maternal deaths in regional hospitals in 2017

	EH	FERH	LH	PH	RMMCH	TMH	AVERAGE	TOTAL
Total deliveries	5226	7351	5740	5577	13072	6709	7279	43675
% of total deliveries	12.0	16.8	13.1	12.8	29.9	15.3	16.7	100
Live births	5153	7221	5622	5553	12588	6586	7120.5	42723
Number of maternal deaths	10	10	14	6	6	9	21.6	55
iMMR	194.1	138.5	249.0	108.0	47.7	136.7	145.5	128.7
Number of deliveries per month	612.6	627.8	478.3	464.8	1089.3	559.1	638.7	3831.9
Number of deliveries per day	20.4	20.9	15.9	15.5	36.3	18.6	21.2	127.6
CS rate	36.8%	35%	37.9%	49%	31%	34%	33.1	100

There were 55 maternal deaths in regional hospitals in 2017. OH, was the leading cause of maternal deaths, followed by NPRI. M&S and HPT occupied third and fourth positions respectively. Two women committed suicide using organophosphate, and another two died of anaesthetic-related deaths. There was one case of herbal poisoning (Table 5.20). Majority (83%) of the maternal deaths due to OH were related to caesarean sections. It was not clear whether the competencies of medical officers/registrars were assessed before they were allowed to perform caesarean sections on their own including the level of supervision they received. Lack of appropriately skilled healthcare workers, delay in referral (which includes delay in emergency transport), inadequate monitoring and delay/inappropriate treatment, lack of ICU beds were the most common contributing factors for maternal deaths occurring in regional hospitals. A common finding in maternal deaths requiring ICU beds was that regional hospitals struggled to find ICU beds resulting in patients being nursed in regional hospitals under sub-optimal and inappropriate clinical conditions.

Table 5. 16: Causes of maternal deaths in regional hospitals in 2017

CAUSE OF DEATHS (n = 55)	TOTAL	% OF TOTAL
OH	12	21.8
NPRI	10	18.2
M&S	8	14.5
HPT	7	12.7
PRS	6	10.9
Unknown	5	9.1
Suicide	2	3.6
Malignancy	2	3.6
Anaesthetic	2	3.6
Herbal poisoning	1	1.8
Total	55	100

5.8.1.3 District hospitals

The highest number of deliveries in DHs was in BGH followed by DYDH. Carletonville Hospital and SRH deliveries fell below the mean (4233) for the group (Table 5.21). SRH recorded the highest CS rate, while DYDH had the lowest rate in the group. CH had the highest iMMR, while DYDH and SRH recorded zero maternal deaths in 2017. It should be noted that CH is located in an old mining community of Carletonville which is far from Leratong, its referral hospital.

Table 5. 17: Deliveries in district hospitals in 2017

	BGH	CH	SRH	DYDH	AVERAGE	TOTAL
Total deliveries	5976	2443	3280	5233	4233	16932
% of total deliveries	35.3	14.4	19.4	30.9	25.0	100
Live births	5889	2362	3198	5220	4167.3	16669
Maternal deaths	4	3	0	0	1.75	07
iMMR	67.9	127.0	0	0	41.99	41.99
Total deliveries per month	498	203.6	273.3	436.1	352.8	1411
Total deliveries per day	16.6	6.8	9.1	14.5	11.75	47
CS rate	24.4%	23%	37%	17.3%	25.4%	100

The three leading causes of maternal deaths in the DHs in 2017 were OH, PRS, and HPT (contributed 28.6% of the total maternal deaths each) (Table 5.22). One patient (14.3%) died of suicide-related burns. She ingested paraffin and set herself alight. She suffered more than 90%-degree body burn. Delay in seeking help was the main contributing factor for maternal deaths related to PRS and HPT complications. All OH-related maternal deaths were related to bleeding during or after caesarean sections. The main underlying factors were poor healthcare workers' skills and poor monitoring. All the OH-related deaths were avoidable.

Table 5. 18: Causes of maternal deaths in district hospitals in 2017

CAUSES 7)	(n =	TOTAL	% OF TOTAL
OH		2	28.6
PRS		2	28.6
HPT		2	28.6
Suicide related burns		1	14.3
Total		7	100

5.8.1.4 Midwife obstetrics units

Among the MOUs in the City of Johannesburg, the highest number of MOU deliveries were at Hillbrow and Alexander. OR Tambo, which is relatively new and small compared with the rest, trailed behind the two. The three MOUs (Alexander, Hillbrow and OR Tambo) are located in the most densely populated regions of Johannesburg. OR Tambo MOU is extremely small, over-crowded, and was opened in 2016 during the last local government election. This MOU has not been upgraded despite the promise made by the local authorities in 2017. The over-crowding created a health hazard and a sub-optimal environment for both healthcare workers and patients. Discoverers had the least number of deliveries in the group (Table 5.23). This MOU is located in one of the less populated areas in Johannesburg. There were no maternal deaths in the during 2017.

Table 5. 19: Deliveries in the City of Johannesburg MOUs in 2017

	ALEXANDER	DISCOVERERS	HILLBROW	OR TAMBO	AVERAGE	TOTAL
Total deliveries	2374	1076	2763	1929	2035	8142
% of total deliveries	21.2	13.2	33.9	23.7	23	100
Maternal deaths	0	0	0	0	0	0
Total deliveries per month	197.8	89.7	230.3	160.8	169.7	169.7
Total deliveries per day	6.6	2.9	7.7	5.4	5.7	22.6

In the City of Ekurhuleni Phillip Moyo MOU was the busiest in 2017 (Table 5.24). This MOU delivered almost the same number as the other two MOUs. Like in the City of Johannesburg, there were no maternal deaths in City of Ekurhuleni MOUs in 2017.

Table 5. 24: Deliveries in the City of Ekurhuleni MOUs in 2017

	KWA THEMA	NOKUTHELA NGWENYA	PHILLIP MOYO	AVERAGE	TOTAL
Total deliveries	730	764	1666	1053	3160
% of total deliveries	23.1	24.1	52.7	33.3	100
Maternal deaths	0	0	0	0	0
Total deliveries per month	60.8	63.4	138	87.4	262.2
Total deliveries per day	2	2.1	4.6	2.9	8.7

The busiest MOU in the West Rand District in 2017 was Bekkersdal (Table 5.25). This MOU delivered almost double the number of women that were delivered by Mohlakeng at the same time period. Mohlakeng was the least busy. There were also no maternal deaths among the West Rand District MOUs in 2017.

Table 5. 20: Deliveries in the West Rand District MOUs in 2017

	BEKKERSDAL WEST	KHUTSONG	MOHLAKENG	AVERAGE	TOTAL
Total deliveries	877	682	461	673.3	2020
% of total deliveries	43.4	33.8	22.8	33.3	100
Maternal deaths	0	0	0	0	0
iMMR	0	0	0	0	0
Total deliveries per month	73.2	57	38	55.6	111.3
Total deliveries per day	2.4	1.9	1.2	1.8	5.5

When the three healthcare districts are compared, MOUs in the City of Johannesburg delivered the highest number of women in 2017 followed by City of Ekurhuleni. The West Rand District had the least number of deliveries (Table 5.26). On a closer look, the City of Johannesburg MOUs had more than two and a half and four times the number of deliveries in MOUs in the City of Ekurhuleni and West Rand District respectively.

Table 5. 21: Total deliveries and maternal deaths in CMJAH cluster MOUs in 2017

	CITY OF JOHANNESBURG	EKURHULENI	WEST RAND DISTRICT	AVERAGE	TOTAL
Total deliveries	8142	3160	2020	440	13322
% of total deliveries	61.1	23.7	15.2	59.3	100
Maternal deaths	0	0	0	0	0
Deliveries per month	678.6	263.2	168.3	370	1110.1
Deliveries per day	22.6	8.7	5.6	12.3	36.9

5.8.2 Deliveries and maternal deaths in the CMJAH Cluster in 2018

5.8.2.1 Central hospital

Deliveries at the CMJAH central hospital in 2018 are summarised in Table 5.27. The total number of deliveries went down during 2018 compared to 2017 however, maternal deaths and caesarean sections increased. This change coincided with the introduction of more stringent referral criteria to CMJAH. It was not possible to assess whether the introduction of a more rigorous referral criteria resulted in the transfer of much sicker women to CMJAH than previously, due to lack of data.

Table 5. 27: Deliveries and maternal deaths in a central hospital in 2018

	CMJAH
Total number of deliveries	8374
Live births	8233
Maternal deaths	20
iMMR	242.9
Deliveries per month	697.8
Deliveries per day	23.3
CS rate	53%

Unlike 2017, the leading cause of maternal deaths at CMJAH Central Hospital in 2018 was NPRI, followed by HPT complications, medical and surgical disorders (M&S), and oncology. The last three conditions had equal contribution in terms of numbers. There was one case of OH. NPRI jumped from fourth place in 2017 to first place in 2018. Of the nine patients who died of NPRI, only two were local. All presented with advanced disease, mainly related to TB and pneumonia (Table 5.28). This finding raises concern regarding non-national citizens' access to healthcare services in Gauteng. Detailed discussion appear later in the thesis.

Table 5. 28: Causes of maternal deaths in a central hospital in 2018

CAUSE (n = 20)	TOTAL	% OF TOTAL
NPRI	9	45
HPT	3	15
M&S	3	15
Oncology	3	15
OH	2	10
Total	20	100

5.8.2.2 Regional hospitals

Like in 2017, RMMCH had the highest number of deliveries both in the cluster and among the regional hospital group, followed by TMH and FERH (Table 5.29). Similarly, RMMCH registered the lowest iMMR in the group. As it was the case in 2017, the highest iMMR was reported by LH.

Table 5. 29: Deliveries and maternal deaths in regional hospitals in 2018

	EH	FERH	LH	PH	RMMCH	TMH	AVERAGE	Total
Total deliveries	5196	7393	6623	6299	12892	7790	7698.8	46193
% of total deliveries	11.2	16.0	13.6	14.3	27.9	16.9	16.6	100
Live births	5089	7259	6573	5482	12650	7644	7449.5	44697
Number of maternal deaths	07	13	17	4	8	15	10.7	64
iMMR	137.6	179	258.6	73.0	63.2	196.23	151.3	143.1
Number of deliveries per month	433	616.1	551.9	524.9	1074	649.2	641.5	3849.1
Number of deliveries per day	14.4	20.5	18.4	17.5	35.8	21.6	21.3	128.2
CS rate	38.4%	29.9%	36.6%	40.7%	39%	36%	36.7%	36.7

NPRI remained the leading cause of maternal deaths in the regional hospitals, with OH, complications of HPT and medical and surgical in second, third and fourth places respectively (Table 5.30.) There were two cases of suicide by organophosphate poisoning. Healthworkers were able to obtain history from one of the patients before her untimely death. She took organophosphate to escape from domestic violence. Like in 2017, the majority of the OH-related deaths were related to caesarian sections. Late presentation, especially among non-national patients, continued to be a common factor in the NPRI group, while poor surgical skills, poor monitoring and lack of ICU beds were

the main contributors in maternal deaths related to OH. Poor ANC attendance, delays in transfer, poor monitoring and lack of ICU were among the common factors that contributed to maternal deaths that were due to complications of HPT. There was two cases of maternal deaths due to suicide in 2018. Among the unknown cases were acute collapse cases and healthcare workers suspected pulmonary embolism. The post-mortem results were not released to the principal investigator due to regulations that govern forensic postmortems.

Table 5. 22: Causes of maternal deaths in regional hospitals in 2018

CAUSE (n = 64)	TOTAL	% OF TOTAL
NPRI	18	28.1
OH	15	23.4
HPT	14	21.9
M&S	9	14.1
PRS	3	4.7
Suicide	2	3.1
Acute collapse	2	3.1
Others	1	1.6
Total	64	100

5.8.2.3 District hospitals

District hospitals delivered fewer patients than RHs in 2018. However, both the total number of deliveries and maternal deaths were higher than in 2017. The number of maternal deaths was double that of 2017. BGH had the highest number of deliveries, followed by DYDH. DYDH had the lowest iMMR while CH had the highest iMMR despite recording the lowest number of deliveries in the group (Table 5.31).

Table 5. 23: Deliveries in district hospitals in 2018

	BGH	CH	SRH	DYDH	AVERAGE	Total
Total deliveries	6289	2593	3141	5329	4338	17352
% of total deliveries	36.2	14.9	18.1	30.7	24.9	100
Live births	6199	2568	3053	5306	4281.5	17126
Maternal deaths	2	8	3	1	3.5	14
iMMR	31.8	311.5	98.3	18.7	115.1	81.7
Total deliveries per month	524.1	216.1	261.8	444.1	361.5	1446.1
Total deliveries per day	17.5	18	8.7	14.8	14.8	59
CS rate	27%	31%	34%	16.9%	27.2%	22.7

NPRI was also the leading cause of maternal mortality in DHs in 2018, followed by OH (Table 5.32). In the OH group, the main contributing factors were lack of skills delay infrequent monitoring and delay in transferring patients to higher levels of care. This was similar to 2017 in terms of contributing factors among the OH-related maternal deaths. Like it was the case with RHs, DHs reported two cases of acute collapse unfortunately, post-mortem results were not available however, attending healthcare workers suspected pulmonary embolism (PE). The recurrent theme of acute collapse without postmortems raises some concerns.

Table 5. 24: Causes of maternal deaths in district hospitals in 2018

CAUSE (n = 14)	TOTAL	% OF TOTAL
NPRI	5	35.7
OH	4	28.6
HPT	2	14.3
Acute collapse	2	14.3
Unknown	1	7.1
TOTAL	14	100

5.8.2.4 Midwife obstetrics units

In the City of Johannesburg, Hillbrow MOU continued to deliver the highest number of women followed by OR Tambo. Discoverers continued to deliver the least number of women. No maternal deaths were reported by the MOUs in the City of Johannesburg in 2018 (Table 5.33).

Table 5. 25: Deliveries in the City of Johannesburg MOUs in 2018

	ALEXANDER	DISCOVERERS	HILLBROW	OR TAMBO	AVERA GE	TOTAL
Total deliveries	2360	1311	2901	1997	2142.3	8569
% of total deliveries	27.5	15.3	33.9	23.3	25.0	100
Maternal deaths	0	0	0	0	0	0
Total deliveries per month	196.7	109.3	241.8	166.4	178.6	714.2
Total deliveries per day	6.6	3.6	8.1	5.5	6.0	23.8

The delivery load in the City of Ekurhuleni MOUs continued to mirror that of 2017 (Table 5.34). Philip Moyo continued to be the busiest among the three MOUs. There were also no maternal deaths in 2018.

Table 5. 26: Deliveries in the City of Ekurhuleni in 2018

	KWA THEMA	NOKUTHELA NGWENYA	PHILLIP MOYO	AVERAGE	TOTAL
Total deliveries	525	720	1680	975	2925
% of total deliveries	17.9	24.6	57.4	33.1	100
Maternal deaths	0	0	0	0	0
Total deliveries per month	43.8	60	140	81.3	243.8
Total deliveries per day	1.4	2	4.7	2.7	8.1

In the West Rand District, Bekkersdal MOU was leading in terms of the number of deliveries and Khutsong continued to lag behind the other two MOUs (Table 5.35). There were also no maternal deaths reported.

Table 5. 27: Deliveries in the West Rand District MOUs in 2018

	BEKKERSDAL WEST CHC	KHUTSONG CHC	MOHLAKENG	AVERAGE	TOTAL
Total deliveries	771	429	647	615.7	1847
% of total deliveries	41.7	23.2	35.0	33.3	100
Live birth	769	427	645	613.7	1841
Maternal deaths	0	0	0	0	0
Total deliveries per month	64.3	35.8	53.9	51.3	154
Total deliveries per day	2	1.2	1.8	1.7	5

When the three health districts were compared, MOUs in the City of Johannesburg continued to conduct the highest number of deliveries followed by the City of Ekurhuleni even with the Ebony Park MOU excluded (Table 5.36). Ebony Park MOU was opened in 2020 by the City of Johannesburg , effectively increasing the number of MOUs from four to five.

Table 5. 36: Total deliveries and maternal deaths in the CMJAH cluster MOUs in 2018

	CITY OF EKURHULENI	CITY OF JOHANNESBURG	WEST RAND DISTRICT	AVERAGE	TOTAL
Total deliveries	2925	8569	1824	4439	13318
% of total deliveries	22	64.3	13.7	33.3	100
Maternal Deaths	0	0	0	0	0
iMMR		0	0	0	0
Total deliveries per month	243.8	712.2	152	369.3	1108
Total deliveries per day	8	23.8	4.8	12.3	36.7

5.8.3 Deliveries and maternal deaths in the CMJAH Cluster in 2019

5.8.3.1 Central hospital

There were 9101 women who delivered at CMJAH in 2019. This number was higher compared to 2017 and 2018. The iMMR was lower than in 2018 but higher than in 2017 (Table 5.37).

Table 5. 37: Deliveries and maternal deaths in CMJAH in 2019

Total number of deliveries	9101
Live births	8993
Maternal deaths	20
iMMR	222.4
Deliveries per month	158.4
Deliveries per day	5.3
CS rate	49%

The leading cause of maternal deaths during 2019 were complications of hypertension complications, followed by NPRI (Table 5.38). South Africans contributed 55% of the maternal deaths and the remainder were non-nationals. Seventy percent (14/20) of the maternal deaths were booked. Nine (45%) of the maternal deaths were women living with HIV. Three out of the five (60%) women who died due to NPRI or complications of HIV were non-nationals, and the mean CD4 count among them was 10.3. The main contributing factors for the maternal deaths at CMJAH in 2019 included delay in seeking help, delay in referral, sub-standard care as well as lack of ICU beds.

Table 5. 28: Causes of maternal deaths in CMJAH in 2019

CAUSES (n = 20)	TOTAL	% OF TOTAL
Complications of HPT	7	35
NPRI	5	25
OH	3	15
M&S	3	15
Malignancy	1	5
Other	1	5
Total	20	100

5.8.3.2 Regional hospitals

In the case of RHs, RMMCH continued to deliver the highest number of women in 2019, followed by TMH (Table 5.39). As was the case in the previous two years, RMMCH had the lowest iMMR in the group. Similarly, LH continued to register the highest iMMR followed by TMH.

Table 5. 39: Deliveries and maternal deaths in regional hospitals in 2019

	EH	FERH	LH	PH	RMMCH	TMH	AVERAGE	TOTAL
Total deliveries	5859	7897	6731	6426	14199	8511	8270.5	49623
% of total deliveries	11.8	15.9	13.6	12.9	28.6	17.2	16.7	100
Live births	5685	7738	6553	6315	13974	8390	8109.2	48655
Number of maternal deaths	5	8	18	9	5	15	10	60
iMMR	87.9	103.4	274.7	142.5	35.7	178.8	137.2	123.3
Number of deliveries per month	488	658	561	536	1183	709.3	705.9	4235.3
Number of deliveries per day	16	21	19	18	39	24	22.8	137
CS rate (%)	34.1	29.0	33.3	41	36	34	34.6	100

Obstetrics haemorrhage was the leading cause of maternal deaths, followed by medical and surgical conditions (Table 5.40). Pulmonary embolism contributed 46.1% of the maternal deaths in the M & S group. NPRI was the third commonest cause of maternal mortality in RHs in 2019. Under-estimation of the severity of the condition, delays in transferring patients, delays and/or sub-standard management, poor surgical skills, inadequate monitoring, lack of theatre and ICU, were the most common factors that were associated with maternal deaths due to OH. Lack of staff was the most common recurring reason for poor monitoring. Defaulting treatment and delays in seeking help were the two most common contributing factors for NPRI associated maternal deaths. Lack of high care and ICU facilities were the most cited challenges associated with maternal deaths due to medical and surgical complications. Similarly, delays in seeking help and transferring patients to the next level of care were the most common findings associated with maternal deaths due to complications of HPT. In some cases, referral hospitals were on divert resulting in lower level of care managing patients that they were not supposed

to have managed. There was one anaesthetic death and this death was due to the lack of skills from the side of the healthcare worker.

Table 5. 29: Causes of maternal deaths in regional hospitals in 2019

CAUSE (n = 60)	TOTAL	% OF TOTAL
OH	18	30
M &S	13	21.7
NPRI	12	20
HPT	10	16.7
PRS	6	10
Anaesthetic related	1	1.7
Total	60	100

5.8.3.3 District hospitals

Among district hospitals, BGH had the highest number of deliveries in 2019, followed by DYDH. BGH and SRH recorded the highest iMMR in the group (Table 5.41)

Table 5. 41: Deliveries in district hospitals in 2019

	BGH	CH	SRH	DYDH	AVERAGE	TOTAL
Total deliveries	5881	2517	3191	5157	4186.5	16746
% of total deliveries	35.1	15.0	19.1	30.8	25	100
Live births	5305	2508	3163	5119	4023	16095
Maternal deaths	4	1	2	0	1.8	7
iMMR	75.4	38.9	63.2	0	43.5	43.5
Total deliveries per month	422.1	209.8	265.9	429.8	331.9	1327.6
Total deliveries per day	14.7	7.0	8.8	14.3	11.2	44.8
CS rate (%)	28	34	31	18	27.8	

The leading cause of maternal deaths in the district hospital group was NPRI, followed by hypertension complications (HPT) (Table 5.42). There were no deaths due to OH. Delay in seeking help, inability to transfer a patient to a higher level of care due to delays with ambulances, and a lack of ICU beds were among the most common contributing factors for maternal deaths in 2019. Some of the referral hospitals were on divert forcing medical officers to manage sick patients without the necessary expertise and resources. Hospital divert is used to relieve pressure from healthcare institution and is more common in Gauteng.

Table 5.42. Causes of Maternal Deaths in District Hospitals in 2019

CASES n=7)	TOTAL	% OF TOTAL
NRPI	4	57.1
HPT	2	28.6
PRS	1	14.3
Total	7	100

5.8.3.4 Midwife obstetric units

Like the previous years, Hillbrow MOU was still the busiest in terms of the deliveries in the City of Johannesburg followed by Alexander and OR Tambo (Table 5.43). Discoverers, like in the previous two years, had the least number of deliveries. There were two maternal deaths from Discoverers. The causes of deaths were pulmonary oedema and pulmonary embolus (diagnosed on post-mortem). The patient who died of complications of pre-eclampsia (pulmonary oedema) ended up at the MOU because referral hospitals were on divert. Hospital divert was a recurring theme in some of the patients managed at incorrect level of care.

Table 5. 30: Deliveries and maternal deaths in the City of Johannesburg MOUs in 2019

	ALEXANDER	DISCOVERERS	HILLBROW	OR TAMBO	AVERAGE	TOTAL
Total deliveries	2352	1279	2720	2302	2163.3	8653
% of total deliveries	27.2	14.8	31.4	26.6	25	100
Live births	2342	1272	2698	2287	530.8	8599
Maternal deaths	0	2	0	0	0.25	2
Total number of deliveries per month	196	106	226.7	191.8	180.1	720.5
Total number of deliveries per day	6.5	3.5	7.8	6.4	6.1	24.2

Deliveries in the City of Ekurhuleni mirrored the previous two years with Phillip Moyo delivering 60% of the total deliveries in the MOUs in the City of Ekurhuleni followed by Nokuthela Ngwenya. Kwathema had the least number of deliveries (Table 5.44). There was one case of maternal death at Phillip Moyo reported. This woman was unbooked and the cause of death couldn't be established on presentation. The results of the post-mortem were not available.

Table 5. 31: Deliveries in the City of Ekurhuleni MOUs in 2019

	KWA THEMA	NOKUTHELA NGWENYA	PHILLIP MOYO	AVERAGE	TOTAL
Total deliveries	563	735	1908	1068.6	3206
% of total deliveries	17.6	22.9	59.5	33.3	100
Live births	558	732	1889	1059.7	3179
Maternal deaths	0	0	1	0	0
Total number of deliveries per month	47	61	159	89	267
Total number of deliveries per day	1.5	2	5.3	2.93	8.8

In the West Rand district, Bekkersdal and Mohlakeng had the highest number of deliveries, 44.6% and 35.5% respectively. Khutsong continued to deliver the lowest number of women in the group (Table 5.45). There were no maternal deaths.

Table 5. 32: Deliveries in the West Rand District MOUs in 2019

	BEKKERSDAL	KHUTSONG	MOHLAKENG	AVERAGE	TOTAL
Total deliveries	856	381	682	639.0	1919
% of total deliveries	44.6	19.9	35.5	33.3	100
Live births	847	375	679	633.7	1901
Maternal deaths	0	0	0	0	0
Total deliveries per month	71	31.8	56.8	53.2	159.6
Total deliveries per day	2.4	1	1.8	1.73	5.2

Like in the previous two years, MOUs in the City of Johannesburg delivered the highest number of women, followed by the City of Ekurhuleni (Table 5.46). In line with the size of its population, West Rand District had the least number of deliveries compared to the other two health districts. There were three maternal deaths in the MOUs in 2019, two in the City of Johannesburg and one in the City of Ekurhuleni. Two were related to patient factors (delay in seeking help) and one due to lack of hospital beds because referral hospitals were on divert.

Table 5. 33: Total deliveries in MOUs in 2019

	CITY OF EKURHULENI	CITY OF JOHANNESBURG	WEST RAND DISTRICT	TOTAL
Total deliveries	3206	8653	1919	13788
% of total deliveries	23.3	62.8	13.9	100
Live birth	3179	8599	1901	13679
Maternal deaths	1	2	0	3
iMMR	0	23.3	0	14.6
Total deliveries per month	267.1	721.1	159.9	1148.1
Total deliveries per day	8.9	24.0	5.3	38.2

5.8.4 Summary of cluster deliveries and maternal deaths during the period 2017-2019

5.8.4.1 Trend in cluster deliveries during the three year study period

Total deliveries in the cluster were on an upward trend with a sharp increase noted between 2018 and 2019 (Figure 5.1). Whether this trend will continue going forward remains to be seen. However, there is a high likelihood that the number of deliveries will increase based on the trend seen in this study and the population statistics data that projects an increase in Gauteng's population in the coming years (Stats SA, 2019). Similarly, CMJAH and MOUs had an increase in deliveries but not at the same rate seen in RHs.

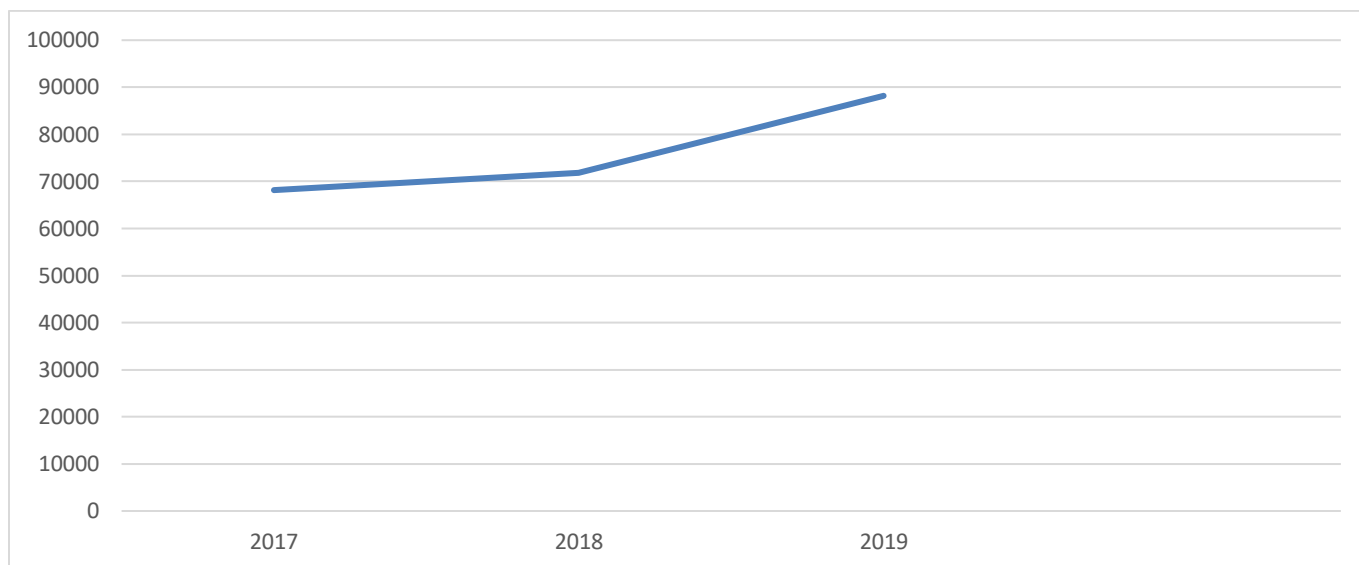


Figure 5. 1: Trend in cluster maternity deliveries 2017-2019

The increase in deliveries were mainly at RHs where 54% of the cluster deliveries took place (Figure 5.2). There was a slight increase in deliveries in CMJAH and MOUs. While DHs had the second-highest number of deliveries within the cluster, the number of deliveries in DHs seems to have remained constant.

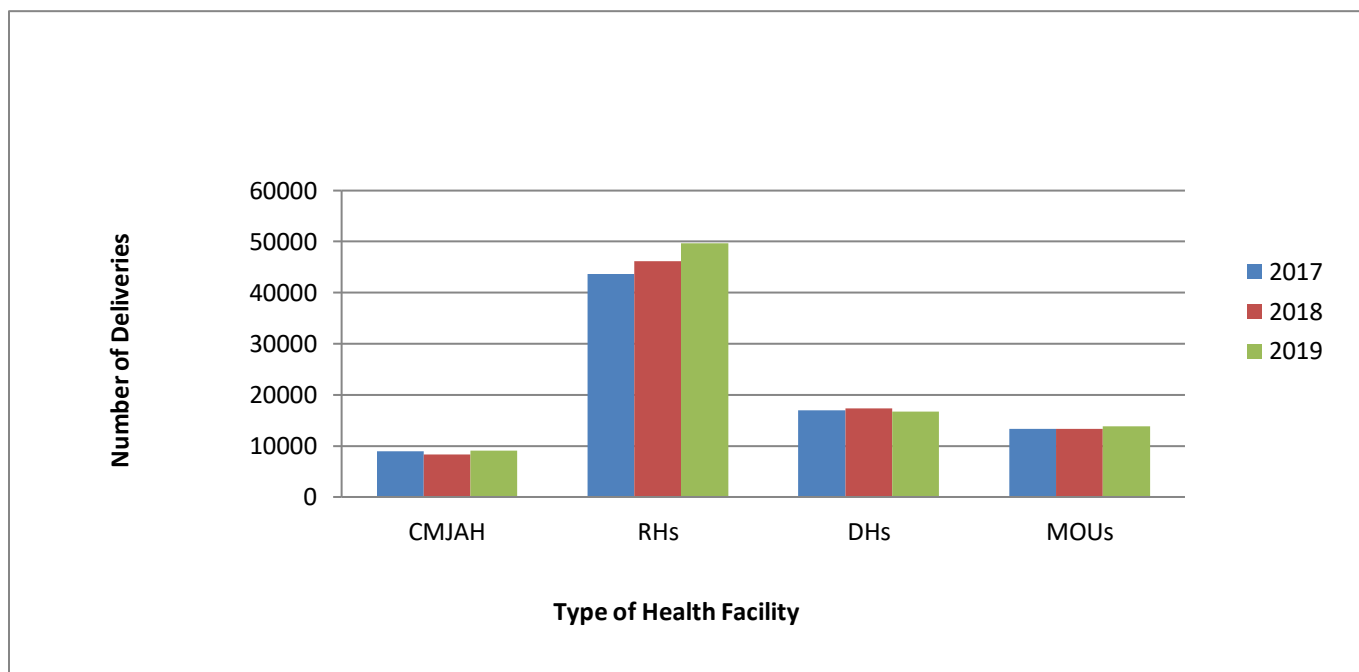


Figure 5. 2: Maternity deliveries per level of care

In terms of RHs, the highest number of deliveries during the three-year study period was at RMMCH followed by TMH and LH (Figure 5.3). Edenvale Hospital had the lowest number of deliveries. LH contributed the highest number of maternal deaths across the cluster, followed by TMH and FERH. TMH was second in terms of the total number of deliveries and maternal deaths in the cluster. LH was fourth and first in terms of its cluster contribution to the total number of deliveries and maternal deaths, respectively. Overall, LH, TMH and FERH had a disproportionate number of maternal deaths compared to the delivery load (Figure 5.3).

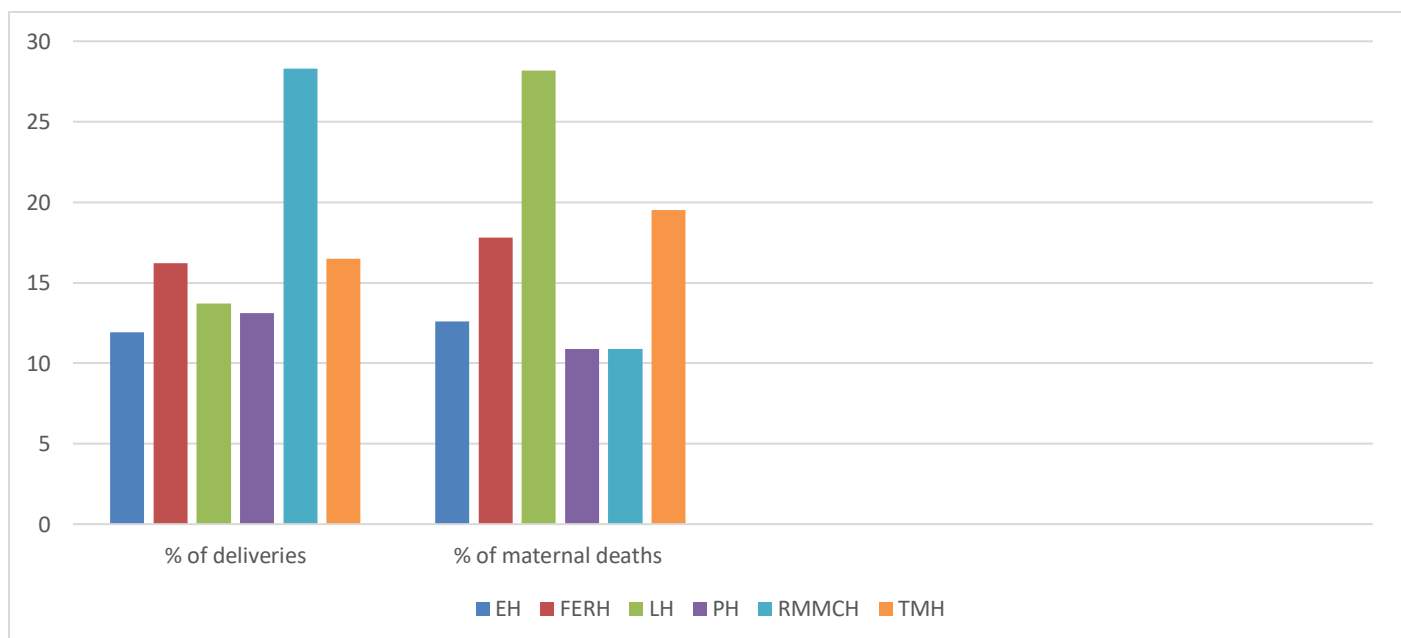


Figure 5. 3: Percentage contribution of each regional hospital to the total cluster deliveries and maternal deaths at regional hospitals

Among the district hospitals, BGH contributed had highest number of deliveries during the three-year study period followed by DYDH (Figure 5.4). The lowest number of deliveries were in Carletonville. However, Carletonville had the highest iMMR in the group despite having the lowest number of deliveries. Carletonville referred patients to Leratong hospital, a distance of 51km away.

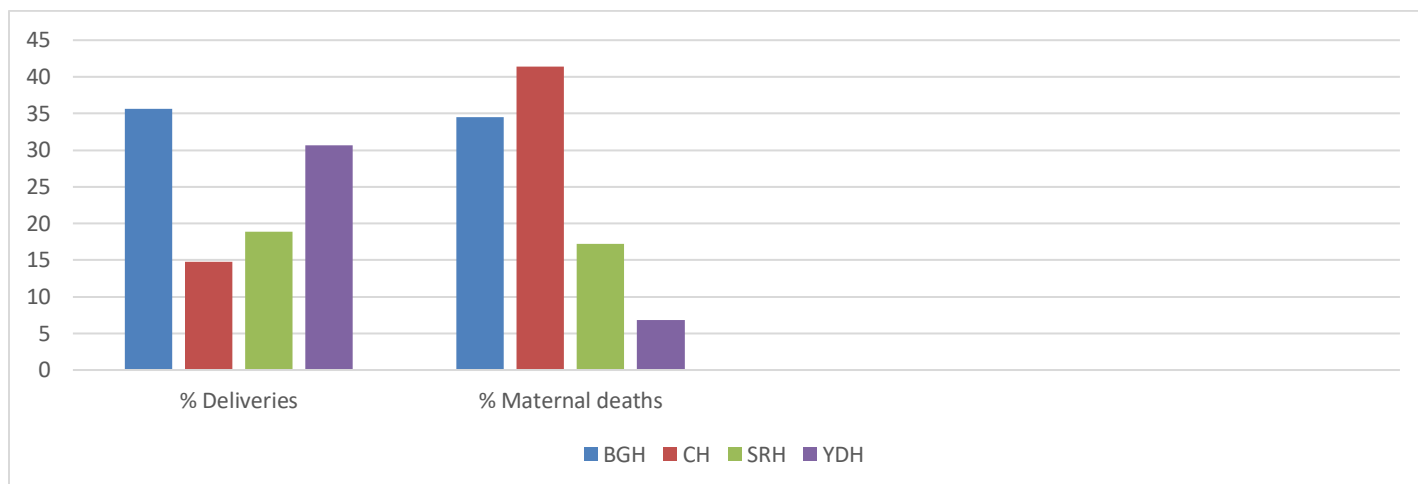


Figure 5. 4: Percentage contribution of each district hospital to the total cluster deliveries and maternal deaths at district hospitals

When MOUs in the three health regions were compared, the City of Johannesburg contributed the highest number of deliveries followed by the City of Ekurhuleni. The West Rand district had the least contribution (Figure 5.5).

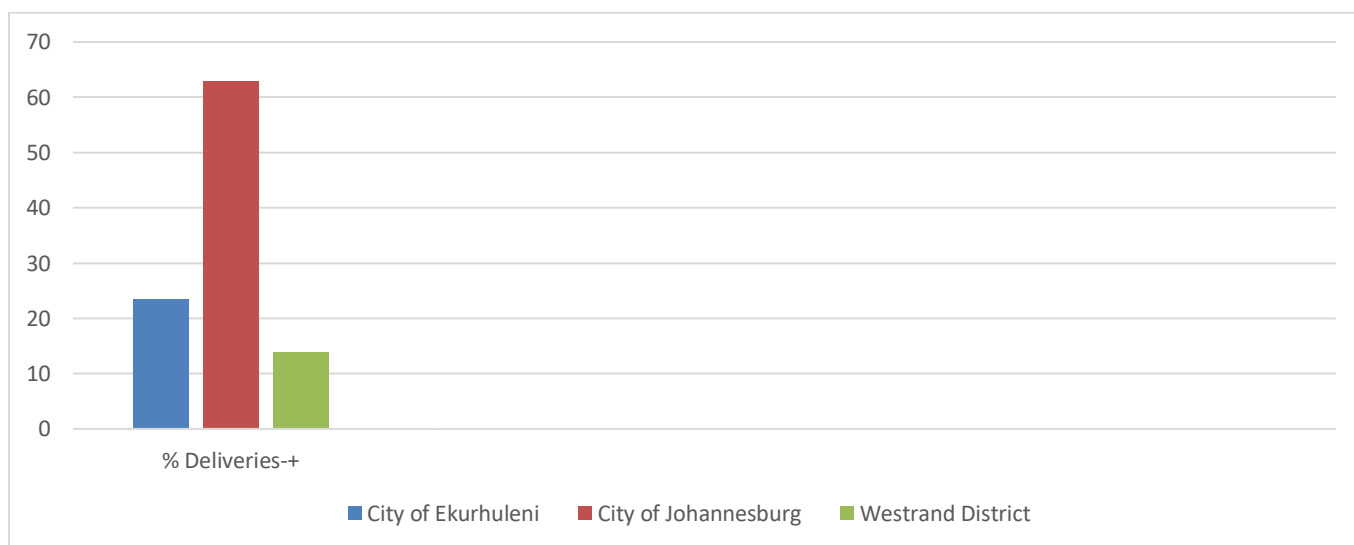


Figure 5. 5: Contribution of each health region to total MOU deliveries

Overall, the iMMR in the CMJAH has been on a downward trend (Figure 5.6). To appreciate the trend in maternal mortality, the study calculated cluster iMMR over eight years.

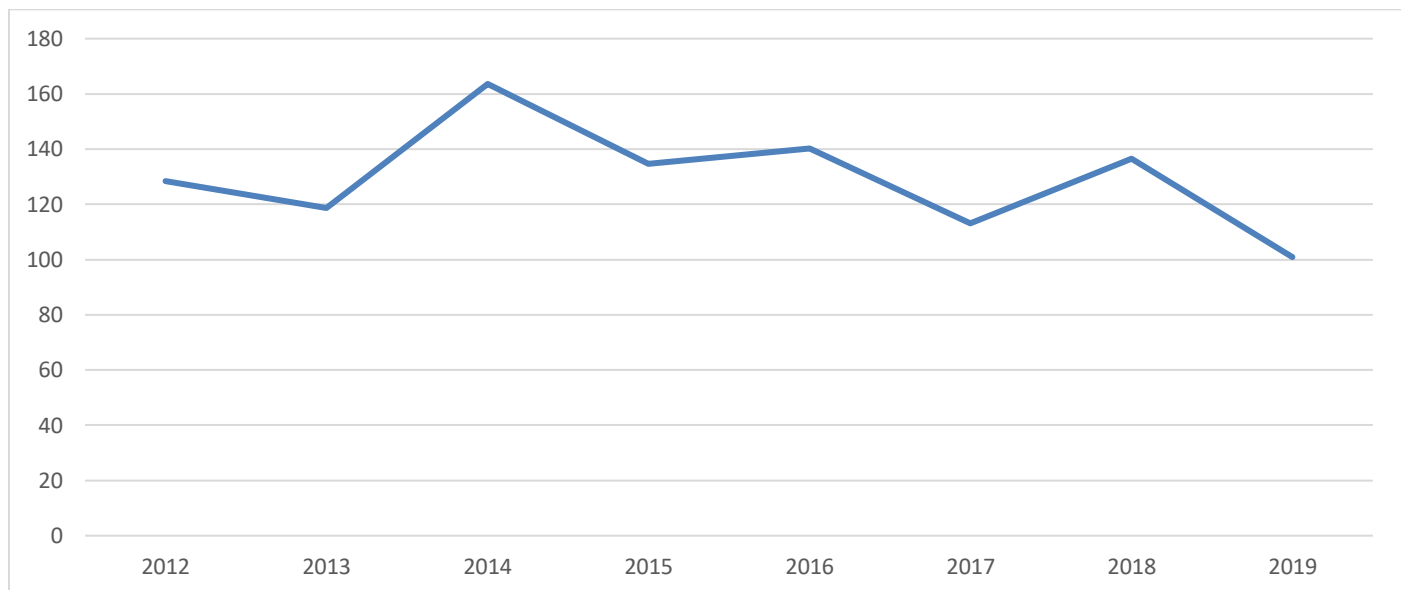


Figure 5. 6: Eight-year trend in iMMR in the CMJAH Cluster

There are a important points to note. Regional hospitals had the highest number of deliveries (54%) and maternal deaths (70%) of the total in the cluster. District hospitals had the second highest number of deliveries, but contributed only 11% of the total maternal deaths in the cluster. A possible explanation could be that patients in district hospitals did not have major complications and if they did, were properly managed. An alternative explanation could be that women who were critically ill or with complications were transferred higher levels of care where they died. The latter is most likely to be the case given the findings reported in the Saving Mothers Reports that most women who died in regional and tertiary hospitals were first seen and managed in the MOUs and DHs (DOH, 2019; DOH 2020). Charlotte Maxeke Johannesburg Academic Hospital was the second-highest in terms of its proportional contribution to the total number of maternal deaths in the cluster despite only contributing 10% to the total cluster deliveries. This is likely a reflection of the severity of patients' illnesses and possibly, and possibly an

increase in the referral of very sick women from cluster healthcare facilities to CMJAH after the review of the in 2016 referral guidelines. The new guidelines required all healthcare facilities to refer patients with complicated medical conditions and severely ill women to CMJAH regardless of the level of care where they presented . Figure 5.7 summarises the above.

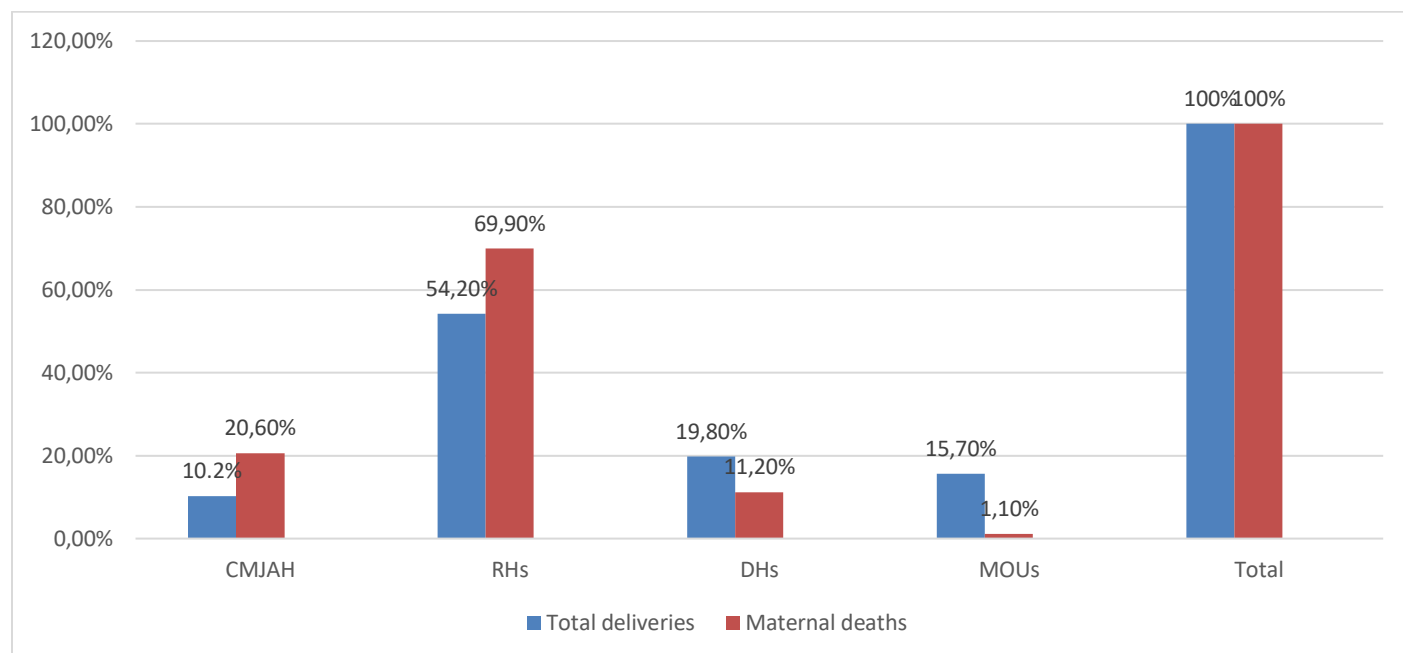


Figure 5. 7:Percentage contribution of the different levels of care to total cluster deliveries and maternal deaths

The different levels of care in the cluster except for the MOUs, experienced a reduction in iMMR during the study period, however only RHs showed a consistent reduction during the three-year study period (Figure 5.8). The reduction occurred in the background of an increase in the number of deliveries.

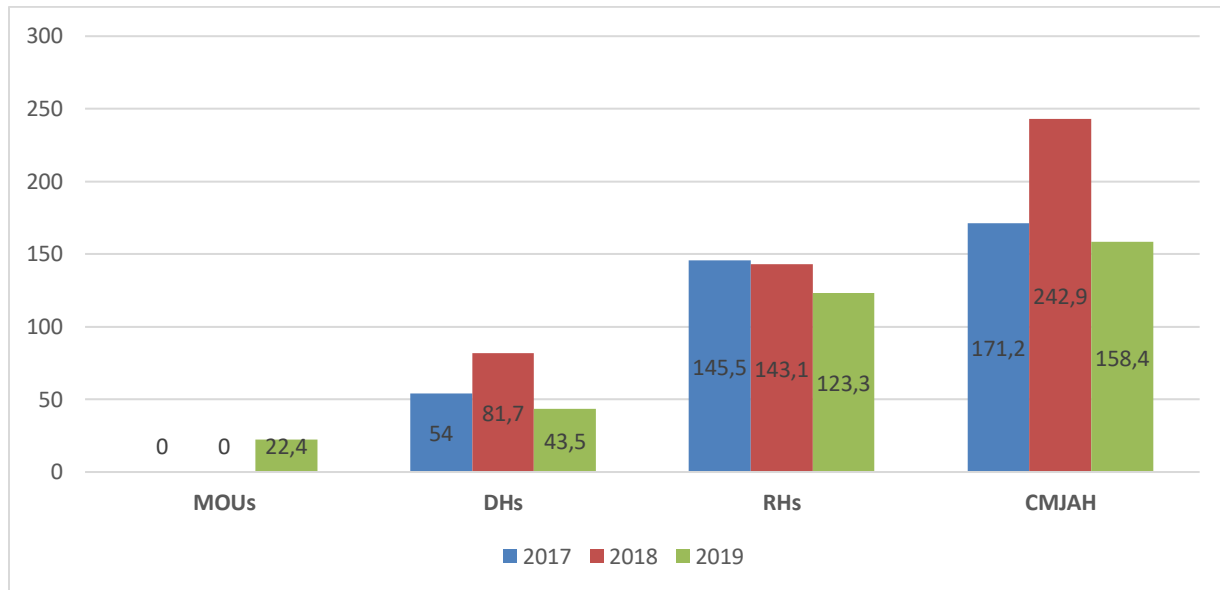


Figure 5. 8: Trend in iMMR per level of care

Figure 5.9 is a summary of the contributions of the three healthcare regions to the total number of deliveries and maternal deaths in the cluster. The highest number of deliveries and maternal deaths were in the City of Johannesburg followed by the City of Ekurhuleni. However, compared with the other two regions, the City of Johannesburg contributed slightly less maternal deaths as a proportion of its deliveries. What is important to note is that the contribution of the proportional contribution of the City of Ekurhuleni to the total number of deliveries and maternal deaths in the cluster was similar. The least number of deliveries and maternal deaths were in the West Rand District; however, the region had a disproportionate number of maternal deaths compared to deliveries.

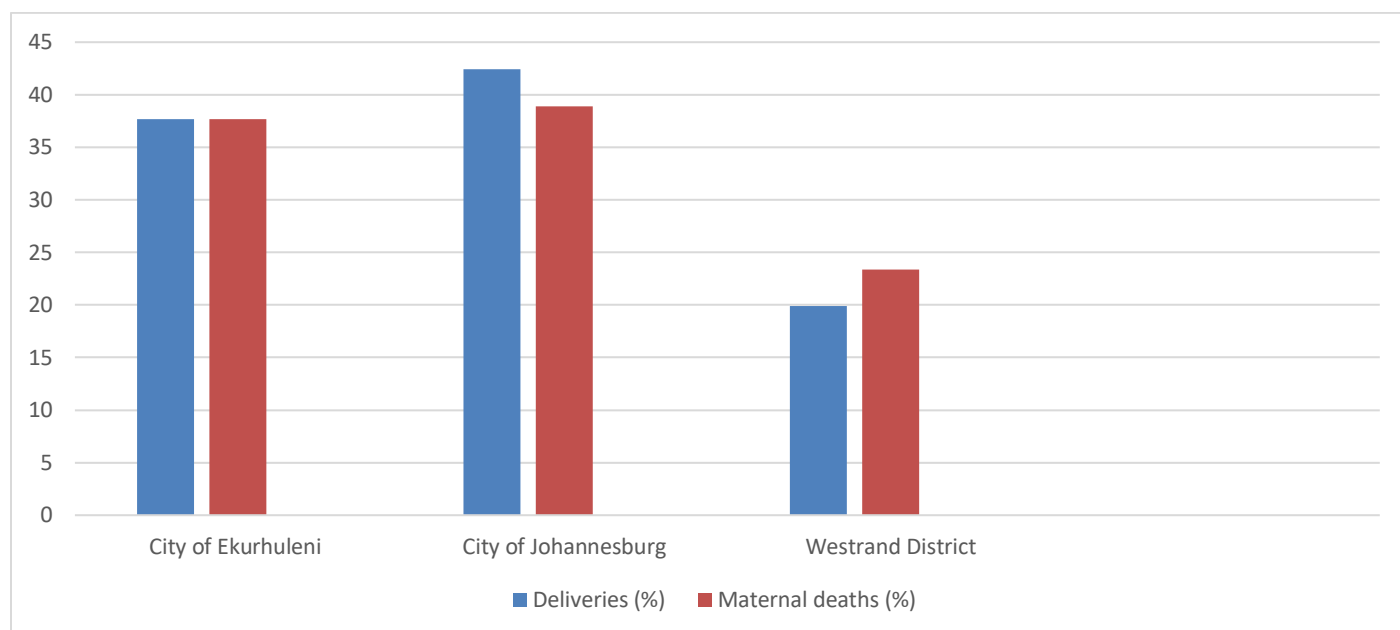


Figure 5. 9: Health district contribution to cluster deliveries and maternal deaths

5.8.4.2 Non-national patients in the cluster

Not all health facilities were able to supply data on the number of patients from neighbouring countries who were cared for in the cluster's healthcare facilities. CMJAH had data for the 2016/2017, 2017/2018 and 2018/2019 financial years. During these period non-nationals contributed 27.3% and 36.4% of antenatal clinic patients and labour ward deliveries respectively (Tables 5.47 and 5.48.) Similarly, RMMCH reported that 40% of the hospital's deliveries were non-nationals. The data for DYDH for 2018 was 34%. DYDH did not provide data for 2017 and 2019. During January to July 2019, non-nationals contributed 23% and 34.7% of patients that were managed in labour ward and antenatal clinics at Edenvale hospitals respectively. SRH reported that non-national contributed 60% of the total deliveries in the hospital annually. Other health facilities were not able to provide data on the number of non-nationals that were utilising their healthcare facilities for maternity healthcare services. This data suggests that non-nationals make a significant proportion of pregnant women that are managed in healthcare facilities belonging to the CMJAH cluster.

Table 5. 47: Number of non-nationals attending antenatal care at CMJAH

PERIOD	SA	NON-SA	TOTAL ADMISSIONS	PERCENTAGE CONTRIBUTION OF NON-SA TO TOTAL PATIENT NUMBERS
2016/2017	28173	10294	38467	27%
2017/2018	24979	10303	35283	29%
2018/2019	27247	9553	36800	26%
Total	80394	30150	110550	27.3%

Table 5. 48: Number of non-nationals delivering at CMJAH

PERIOD	SA	NON-SA	TOTAL ADMISSIONS	PERCENTAGE
2016/2017	7040	3243	10283	32%
2017/2018	6280	3767	10047	44%
2018/2019	5719	3878	9597	40%
Total	19039	10888	29927	36.4%

5.9 Overcrowding

All hospitals and some of the MOUs complained of overcrowding. Data was available for CMJAH and Edenvale. CMJAH experienced an exponential increase in the number of patients presenting to emergency obstetric admission unit between July 2017 to December 2017. Subsequent to this period, the numbers continued to increase but at a much slower rate. The existing 22 bed antenatal wards were not able to accommodate the number of patients. More beds (+/- 15) were added to the existing antenatal wards and when full, patients were admitted in other areas. The additional beds were not enough, and a new area with 12 beds was added, but this too, could not accommodate the high number of patients resulting in patients sitting on chairs in the obstetric emergency unit while waiting for a bed to open in the antenatal ward. The above is summarised in Figure 5.10.

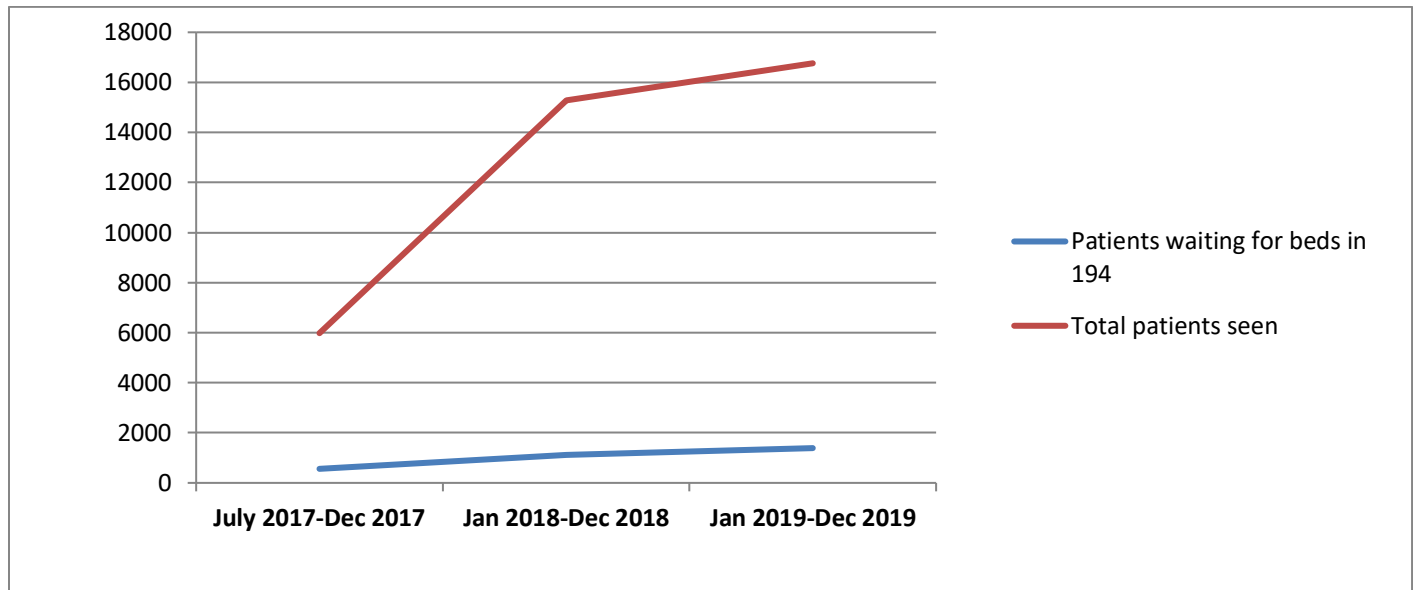


Figure 5. 10: Number of patients sitting on chairs waiting for beds at CMJAH obstetrics admission unit

Edenvale hospital also provided data on the number of patients who had to sit on chairs or slept on floor mattresses between 2017 and 2019 as a result of lack of hospital beds. Like CMJAH, there was an initial increase in the number of patients who sat on chairs or slept on floor mattresses between 2017 and 2019 (Table 5.49). Like was the case with CMJAH, Edenvale responded by creating extra beds without additional manpower.

Table 5. 49: Number of patients sitting on chairs or sleeping on floor mattress at EH

YEAR	NUMBER OF PATIENTS
2017	734
2018	1057
2019	1073

5.10 Summary

This chapter described the CMJAH cluster in terms of available resources (number and distribution of healthcare facilities, healthcare resources (personnel, maternity beds) service load (deliveries) and maternal deaths. It was important to include the causes and contributing factors resulting in maternal deaths for the different levels of care as is the standard of practice with maternal deaths audits. Using the CIPP model this chapter managed to describe the Input (number and geographical distribution of healthcare facilities and healthcare resources) and Product (maternal deaths). The next chapter, builds on the above and add additional insight on maternity healthcare services and address the Context, Input, Process and Product albeit without specific use of the terminology.

CHAPTER 6: RESULTS OF THE QUALITATIVE STUDY

6.1 Introduction

Data for the qualitative component came from four sources, review of the CPF, semi-structured interviews, site visits and the review of minutes of the cluster morbidity and mortality meetings and review of CPF

6.2. Review of the CPF

The purpose of CPF review was to determine its purpose, underlying philosophy /guiding principles and governance structures and processes. The following were main reasons the CPF was introduced:

- To strengthen district healthcare services and ensure that PHC services are the first entry points into the health system.
- To create continuity of care and improve patient's experience.
- To support the standardization of care across Gauteng health facilities.
- To expand the academic training platform, create a platform of interaction and support between academic hospitals and other care levels.
- To improve quality of care through the creation of learning communities to improve patient health outcomes.
- Improve clinical care and clinical outcomes.
- Apply system thinking in the management of health services.

The main guiding principle behind the CPF is to strengthen the district healthcare services and the PHC approach. The CPF identified the following as key stakeholders:

- Central, regional and district hospitals
- District Healthcare Services (DHS)
- Emergency Healthcare Services (EMS)
- Hospital boards and clinic committees
- GDOH Hospital Directorate

- Universities and Nursing Colleges

According to the CPF the stakeholders should work together to ensure the smooth running and functioning of the clusters. The stakeholders are also responsible for the clinical governance within the cluster. The framework identifies the clinical head of the central hospital in the cluster is the head of the cluster and has responsibility to coordinate cluster activities. The purpose of the CPF is an attempt to link the different levels of care to form a once continuous health system with the hope that this arrangement would improve clinical governance, coordination of healthcare services and accountability (GDOH 2019a).

Further CPF expects clusters to use data to monitor and improve healthcare services, adhere to the hierarchical arrangement of healthcare facilities during patient referrals, implement standardised protocols and adhere to Essential Medicine and Equipment lists. Interviews with healthcare workers

6.3. Interviews

6.3.1 Study participants

A total of 40 participants from the different levels of care within the CMJAH cluster representing different categories of healthcare workers participated in the semi-structured interviews. Selection of study participants started with purposeful and proceeded to theoretical sampling based on the themes and issues that emerged. Majority of the participants were midwives followed by operational nursing managers and medical officers (Table 6.1). The interviews lasted between 30 to 90 minutes.

Table 6. 1: Profile of participants who took part in the interview process

CATEGORY	TOTAL	% OF TOTAL
Head of Clinical Department	2	5
Specialists O&G	4	10
Registrars	3	7.5
Medical officers	7	17.5
Medical interns	3	7.5
Area Nursing Managers	3	7.5
Operational Nursing Managers	7	17.5
Advanced midwives	3	7.5
Midwives	8	20
TOTAL	40	100

6.3.2 Findings

Five main categories and sub-categories representing the different components of the CIPP model and their implications emerged during these interviews. These categories were: (1) Service demand, (2) Service supply, (3) Coordination of healthcare services, (4) Management and leadership and (5) Health outcomes (Table 6.2). For each category, corresponding themes and consequences are discussed in detail in the next section supported with quotations from the interviews with healthcare workers.

Table 6. 2: Main findings

CATEGORY	EXPLANATION	CIPP COMPONENT	THEMES	CONSEQUENCES
1. Service demand	High demand for maternity healthcare services reflecting in the form of higher number of women in healthcare facilities	Context	• Cross border migration • In-country migration • Lack of adherence to referral protocol • Population growth • Incorrect political messaging	• Over-crowding • Communication barriers resulting in inadequate history and incorrect diagnosis as well as patient management. • Delay in attending to patients • Poor quality of care • Increase in patient adverse events • Patient dissatisfaction with care • Increase in patient complaints and medico legal cases • Negative impact on staff well-being and staff morale • Staff absenteeism and resignation
2. Service Supply	Inadequate resources	Input	• Inadequate infrastructure, equipment, blood products, drugs and human resources	• Over-crowding • Lack of supervision of junior members

				• Poor quality of care • Patients nursed on chairs and/or sleeping on floor mattresses • Increase in patient adverse events • Increase medico-legal litigation • Poor staff morale • Staff absenteeism and ill-health • Staff resignation
3. Coordination of healthcare services	Poor management and coordination of maternity healthcare services	Process	• Prolonged ambulance response time • Ineffective referral system	• Overcrowding • Poor quality of care • Increase in patient adverse events, patient complaints and medico legal cases
4. Management and leadership	Poor management and leadership	Process	• Lack of staff support • Managers unwilling to listen to staff • Staff being blamed for anything that went wrong	• Poor staff morale • Negative impact on staff wellness and morale • Staff absenteeism • Staff resignations
5. Health outcomes	Poor patient health outcomes	Product	• Delay in assessing patients	• Adverse patient health outcomes

			• Delays in monitoring patients • Medical errors	• Patient dissatisfaction with healthcare • Delays in seeking healthcare • Increase patient complaints and medico-legal litigation • Adverse event of staff wellbeing and morale • Staff absenteeism and resignation
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6.3.2.1 Service demand

Healthcare workers reported that there was an increase in demand for maternity healthcare services and this increased created high service load:

“The patient numbers are too large.” (Participant 18, Medical Intern)

“So, I think it’s patient load. It’s patient load and lack of resources.” (Participant 20, Registrar).

According to the participants, three reasons were behind the increase in patient numbers:

- Cross-border migration

Healthcare workers attributed the increase in patient load to the high number of non-nationals within the health system. They view this to be the result of porous borders and lack of control at national border posts. The migrant population that health workers saw included refugees, illegal and undocumented immigrants. Healthcare workers were of the opinion that many moved to Gauteng to look for jobs.

“The influx of patients coming from other countries is too much.” (Participant 28, Midwife).

“Yo, to be brutally honest, it is our porous borders. We are currently keeping statistics regarding foreign patients that come into our institution. Shoo - you get a lot of them that are undocumented. When you want a passport number and they tell you that they do not have one, that’s when you see they are undocumented.” (Participant 35, Advanced Midwife)

“It is a huge problem, especially here, I think, Joburg. We are seeing patients that are not really our locals. They are workers coming to look for jobs, refugees and illegal immigrants.” (Participant 33, Medical Officer).

- In-country migration or inter-provincial migration

The second group of patients were from other provinces who came to Gauteng in search to seek healthcare services.

“You never know why people from Mpumalanga, people from KZN booked for Caesar there, maybe on the 22nd, like today, and then she comes here and then you ask why didn’t you go where you were booked for the caesarean. They often respond by saying: ‘Caesar is a Caesar. If they can do it there, then you also can do it here.’ Often, we do not have enough information about the pregnancy and our patients are litigious.” (Participant 36, Operational Manager).

It was not only the increase in number that was a concern to healthcare workers, some of the patients were hostile to the staff as illustrated by the quotation above. These patients also did not provide adequate information regarding their pregnancy, something healthcare workers identified as a medico-legal risk.

- Lack of and poor adherence to referral protocols

According to healthcare workers, the third reason for the increase in patient numbers was due to the lack of adherence to referral pathways. Patients were ignoring referral pathways and presented in facilities they were not supposed to. This situation exerted considerable stress on the health system and healthcare workers and their ability to provide quality healthcare services.

“I don’t know what is happening. Every area has its demarcation, but it’s like we are seeing everyone from every walk of life’ Strenuous! The numbers are exorbitant. You actually have to develop a different working strategy.” (Participant 35, Advanced Midwife).

The following factors were thought to contribute to the lack of adherence to referral protocols:

- Patients’ lack of understanding of the referral system and referral pathways

Patients were bypassing primary healthcare clinics and presenting to hospitals due to lack of knowledge regarding referral pathways and protocols.

“I think patients do not understand levels of care they need to start from or use. They just go straight to the hospital without being seen at the MOU, so I think it’s the level of care that the patients need to be educated on.” (Participant 29, Midwife)

“I think there are people who do not know how the referral system works. You see a person who just comes unbooked. Then we got patients that are referred for, you know,

other reasons you feel could have been dealt with at primary care; but then there is nothing you can do. You can't send the patient back. You have to see them." (Participant 28, Midwife).

- Lack of enforcement of referral protocols

There was also lack of enforcement to referral pathways in addition to the lack of patient adherence. Participant 22, who previously worked in KZN, felt that one of the problems with Gauteng Province was the lack of both understanding and enforcement of referral pathways and protocols. Unlike Gauteng, the different categories of health workers in Kwazulu-Natal understood the roles of the different levels of care as well as the referral system. Emergency personnel in Kwazulu-Natal played a major role in ensuring that patients were transported to the appropriate level of care after assessing their health needs.

"I'm going to go back to the referral system. That is a challenge I think in Gauteng. I did my internship in KZN, and in KZN there is a clear outline of what should be in a primary healthcare centre and what should be referred up. And that is also communicated to, let's say, ambulance personnel. If you call the ambulance to say this is what's wrong with me, they will monitor you and they will say, no, you are actually not supposed to go here, you are supposed to go there. There are no such thing as just walk-in patients. You come by referral. So, I think by accepting everybody that comes we are also doing a disservice to the patients because instead of reserving our energy for high-risk patient that is going to need our attention, we are seeing things that could have been managed at a lower level." (Participant 22, Medical Officer).

The lack of adherence and enforcement of referral pathways and protocols resulted in health workers working in tertiary hospitals spending more time looking after low risk instead of high-risk patients. The following were cited as some of the reasons for the lack of adherence to referral pathways and protocols:

- Inconsistent public messages and undue pressure from politicians

Health workers blamed the lack of adherence to protocol on incorrect political messages. The messages that politicians communicated to the public were in direct contrast of the referral protocols that were agreed upon by stakeholders including the very same politicians.

“Sometimes - I wouldn’t like to put politics into it, but you know - I think politics and whatever we are doing here, you know, are not together; because you know how our politicians on national televisions will encourage people, you know, to come and attend clinic. And then the people come. What they are doing and what they tell patients are in opposition. Like we tell patients to use the services nearer to them, but they (the politicians) are telling them they can go anywhere they want. They say they are promoting patients’ rights.” (Participant 34, Operational Manager)

Participants identified the following consequences in the increase in patient numbers:

- Over-crowding

The increase in patient numbers resulted in over-crowding in healthcare facilities.

“In maternity admissions we are working in a situation whereby we are not supposed to say, no, you cannot come here. We can’t turn them back so we take them. And as a result, we experience over-crowded wards and you may find out that they are there in ... [place withheld] and they do not have a place to sit or sleep. Most of the patients will sit on plastic chairs or sleep on the floor while waiting for a bed” (Participant 31, Area Manager).

Patients had to sit on plastic chairs or sleep on the hospital floors while waiting for a hospital bed to open.

- Delay in attending to patients

Health workers were unable to attend to emergencies and referrals timeously. This delay contributed to the increase in adverse outcomes, increase in patient complaints and medico legal cases.

“We have two doctors, so patients wait for long time to see a doctor.” (Participant 5, Midwife)

“That is why a patient will be referred from a clinic and normally seen more than four hours later because there were thirty other patients before them.” (Participant 27, Registrar)

“In our ward (emergency obstetrics admission), our waiting period target is 4 hours - so now we have so many patients, we can’t meet that four hour. Some patients are referred for fetal distress and by the time you get to them it’s either too late or all theatres are all occupied” (Participant 28, Midwife).

“By the time you get to the patient they are so agitated an uncooperative and understandably so. Some end up with adverse event and we found ourself writing incidents and medicolegal reports day in and day out”.’ (Participant 35, Advanced Midwife).

- Poor quality of care due to overcrowding, communication problems, unbooked patients and medical conditions that the staff were unfamiliar with.

Health workers pointed out that both the high number of patients and high number of non-nationals created challenges for them. Not only did maternity system experience extreme pressure, some of the non-nationals were unbooked while others presented with diseases which were unfamiliar to the healthcare workers. This was further made worse by the communication breakdown.

“It is the influx of patients. We are receiving patients from all over South Africa. Some are unbooked. The number of patients in relation to a midwife is too high. We are working too hard.” (Participant number 11, Midwife)

“In terms of rendering quality care, I think the biggest challenge is patient overload. We have vast number of patients in South Africa as a whole; but now a lot of migrants have come in. So, our patients load is massive and our clinics dynamics have changed, because we have people coming from different countries who have different disease spectrums compared to South Africa - patients who might not be able to understand or speak English and are therefore unable to advocate for themselves.” (Participant 26, Medical Officer)

“The people from outside, we love them - we don’t hate them. But the number and communication breakdown, yes, it becomes an issue.” (Participant 36, Operational Manager)

Health workers found themselves managing many patients in antenatal clinics or progressing more than one high risk patients in labour. This situation compromised the quality of patient care.

“Strenuous, the number are exorbitant, you actually have to develop a different working strategy. Rather than the normal one-to-one nursing that is the textbook, you are dealing with a neighbourhood. In a neighbourhood, you find yourself progressing three, four patients alone who are high risk.” (Participant 35, Advanced Midwife)

“The problem is quality. Sometimes there would be hundreds, and like, over hundreds of patients in the clinic and the one thing on your mind at that time is to push the line which is really a bad thing. People are not getting proper services. Not so long ago ... [place withheld] was very, very busy and the wrong medication was given to the wrong

patient. Not because the attending doctor did not know what to do. They were under pressure. We are really understaffed. So, we end up compromising quality of care for the patient.” (Participant 24, Medical Intern).

- Patients sat on benches, chairs and slept on the floor due to lack of hospital beds.

“In maternity admissions we are working in a situation whereby we are not supposed to say, no, you cannot come here. We can’t turn them back so we take them. And as a result, we experience over-crowded wards and you may find out that they are there in ... [place withheld] and they do not have a place to sit or sleep. Most of the patients will sit on plastic chairs or sleep on the floor while waiting for a bed” (Participant 31, Area Manager).

- This led to increase in patient complaints.

“I can tell you a story. Yesterday I happened to be in the social worker's office who was interviewing one patient who delivered with us. She was complaining that she came to our ward and she was on the bench, I’m talking from 11 o’clock in the morning, and she was only seen the following day at nine o’clock.” (Participant 17, Medical Officer).

- Lack of food for patients.

Patients who sat on chairs or slept in obstetric admissions area would often go for days without food. This is illustrated by the quotation below from Participant 28, a Midwife:

“That is why patients are sitting on chairs for three days, there are lack of beds in the ward. You see right now there is no food for the patients that are seated there. The patients that I found since yesterday or left them since yesterday are still here, and there is no food for them, because this is a casualty area” [referring to obstetric admission unit]. (Participant 28, Midwife).

- Negative impact on professional relationships and staff wellbeing.

The high number of patients created tensions not only between healthcare workers and patients but also between healthcare workers themselves. Patients would arrive very early in the morning only to be seen very late due to the overcrowding and shortage of staff. Similarly, health workers were working under extreme pressure, were stressed and physically exhausted as a result of managing high numbers of patients. The above situation not only created tensions in the workplace, but also disrupted healthcare workers' social lives. The above is illustrated by the quotations below:

“The clinic is extremely busy. That’s my clinic; and you end up seeing 150-180 patients per day. So it is just long and tiring, which then also impact on patients because they got up early to come clinic and end up waiting for a long time to be seen. By the end of the day, everyone is not in their best mood anymore, which then impacts how you speak to patients, colleagues, doctors and nursing staff.” (Participant 21, Consultant)

“The place is crazy; you will find that you are alone as a doctor and there are a hundred patients that have been referred to you.” (Participant 17, Medical Officer)

“The calls become extremely heavy. We don’t have time to eat or rest, never mind everything else. We work from 8h00 in the morning. You carry on until actual handover, which is 10-11h00 the following day. For me, it is the most challenging thing- I am physically exhausted.” (Participant 33, Medical Officer)

“The number of patients in this hospital is very high and that contributes to the decrease in number of staff. People try to help each other in this hospital, but there are instances where there is tension and lack of cooperation between colleagues, and between departments.” (Participant 22, Medical Officer).

“Oh, we end up having lot of stress and taking our stresses home.” (Participant 3, Operational Manager).

- Staff absenteeism, resignations and the use of agency nurses.

Healthcare workers responded to the high work load by either staying away from work or resigning. To try address the staff shortages, managers employed agency nurses who did not have the necessary experience to render quality healthcare.

“Because of being over-worked, specialized nurses can’t cope anymore and they either do not come to work or basically start looking to other areas for work.” (Participant 12, Area Manager)

“And the other thing that I realized here in labour ward, is the massive shortage of staff. You know what is going on? Staff are resigning, others transfer to other hospitals. When the staff resign, HR does not do anything. They are not being replaced so we end up having to work being short like that. What they have tried to implement is this agency thing, but there’s time that the agency does not pay, and the nurses don’t come to work. Even those agency nurses, some of them come to work knowing nothing, and they need to be developed before they function. The hospital thinks agency is a replacement of staff. I was thinking, why don’t they use the money they use for agency to employ midwives?” (Participant 31, Area Manager).

6.3.2.2 Shortage of resources

Among the challenges that health workers experienced in terms of rendering quality maternity healthcare services was shortage of resources. There shortage of resources was across the board, including inadequate and ageing infrastructure, shortage of human resources, laboratory facilities, equipment, blood products and basic resources such as drugs that are needed for the day-to-day operation of maternity services. In addition to inadequate infrastructure, healthcare workers complained about the layout of clinical working spaces such as labour wards and antenatal clinics. Some of the maternity units lack proper demarcation as was the case in one hospital where maternity admission, antenatal ward and delivery rooms were combined. In addition, some of the hospitals did

not have high care beds and those who had, the high care beds were not enough. As a consequence, health workers had to manage patients under difficult circumstances. This situation is illustrated by the quotes below:

“Our labour ward is not worker-friendly. It’s combined with admission ward. It’s a labour ward, and it’s an ANC ward. So, it is a combination of three wards with staff for one ward.” (Participant 13, Operational Manager)

“We have limited high care beds: we only have four. So, we often have to admit high care patients to the labour ward, which puts additional strain on our nursing staff, who are not necessarily always ICU trained. But we sometimes even ventilate patients in the labour ward. Our units are short staffed: we only have one specialist per unit. So, if someone is on leave, certain units are not covered. We have to cover additional rounds. Sometimes we’re covering additional clinics and additional duties, such as sonar, which obviously puts a strain on what we are doing day by day.” (Participant 30, Specialist)

The infrastructure challenges were attributed to hospitals being old and not having been renovated for many years. Most of the hospitals were built during the apartheid era, when access to healthcare was restricted for the majority of black people. The old infrastructure was no match for the growing patient population. This situation has been made worse by shortage the of personnel. The quotations below illustrate this point:

“We have old hospitals, with their structure that has not been renovated and the population has increased compared to past years. This has been made worse by the shortage of personnel, trained midwives and doctors.” (Participant 10, Operational Manager)

“The infrastructure is not adequate. The hospital was built for a certain number of people and now the community has grown. It is no longer adequate. Whoever built the hospital didn’t consider the community that we are serving and never consulted them.”

Clinicians were never consulted either because of the way the hospital is structured. We need a high care, where is our higher care area? We have patients with pre-eclampsia; but we do not have a designated place to nurse them. We just put them anywhere, and they tend to be managed like any other patient. That's when we start seeing complications.” (Participant 7, Area Manager)

In addition to inadequate infrastructure, healthcare workers indicated that healthcare facilities were chronically understaffed. This shortage was not limited to doctors but the entire healthcare workforce as illustrated by the quotes below:

“One of the problems that we have, or challenge rather, is the fact that we are under-staffed. I think we are under-staffed because sometimes during a night shift you will find that we are two in a shift and that is when we encounter most of the problems.” (Participant 1, Midwife).

“We have challenges with staff who are not doctors like messengers. The shortage of messengers’ delays getting appropriate lab products to give to patients”. (Participant 37, HOD)

“I think in general our department is short-staffed in terms of people with expertise but especially medical officers. For example, we have generally, one doctor allocated to run labour ward, post-natal ward and antenatal ward, which I think is too little in terms of how many you need to actually run a labour ward well and review patients timeously and follow protocol.” (Participant 11, Medical Intern).

“Most of the time you find that the doctor is alone. At times he is alone the whole night till morning.” (Participant 13, Operational Manager)

“Sometimes, especially on weekends, we find one doctor on call - and then he is looking after the whole hospital, including the gynae cases.” (Participant 19, Midwife)

“The shortage of staff is the first thing. You may find that we are only four on duty and we are running the whole unit. It’s admission, progress, delivery and high-risk ward. So, it’s too much for us.” (Participant 39, Midwife)

“In terms of rendering quality of care there is often shortage of staff. The chronic shortage of staff creates a heavy burden on everyone working and that result in people trying to deliver optimal care being unable.” (Participant 22, Medical Officer)

The shortage of staff as evident from the quotations above, had negative impacts on healthcare workers’ ability to render healthcare services.

In addition to the above, healthcare workers experienced challenges in terms of accessing blood products including shortage of basic equipment – the latter attributed to be a result of inefficiencies in procurement management. The quotes below serve to illustrate these points:

“There is either lack of blood in the blood bank or if there is blood, there is no messenger to go fetch it. You have to run to the blood bank yourself. There is always something going on.” (Participant 33, Medical Officer).

“We have major challenges; such as lack of equipment.” (Participant 40, Specialist)

“One of my biggest challenge is procurement. Whoever is in procurement has to know what to buy for maternity/ labour ward. Sometimes we do not have amnio hooks, because procurement did not buy them.” (Participant 38, Midwife).

6.3.2.3 Consequences of shortage of resources

Health workers identified the following as consequences of the lack of resources:

- Overcrowding

Healthcare facilities experienced overcrowding the consequences of which have been discussed in preceding sections.

- Defensive medicine and compromised patient care

Because of the shortage of staff, health workers were unable to deliver the type of care they were trained to do. They found themselves practising defensive medicine as way to try reduce medico legal risks. This is captured in the quote of Participant 16, a specialist:

“Managing patients is a challenge. You have the correct diagnosis, but you do not have proper staffing. Let’s say for example you want BP taken hourly or two-hourly at a specific time but because of staffing, you cannot do that, meaning you have to come with plan B. Sometimes plan B might lead to aggressive management and even delivery. In case of delivery, you know the best mode should be an induction, but because you cannot monitor the patient, you end up forced to choose a caesarean section delivery instead”. (Participant 16, Specialist)

- Lack of time to monitor and educate patients

Midwives were unable to monitor patients or deliver healthcare education to their patients especially nursing mothers. The lack of monitoring and healthcare education impacted negatively on the health of the mothers and new-borns:

“It is not easy, because most of the time you have shortage of staff in labour ward. You only have midwives in labour ward, but you don’t have ENs (enrolled nursing assistants) - people who are going to help you do vital signs in post-natal wards when you do discharges. It is difficult for a midwife to deliver, do ANC, do admissions and make sure that by the time the mother leaves hospital she got the basics and proper understanding of what she needs to do when she gets home.” (Participant 2, Midwife).

- Adverse events

The shortage of staff resulted in sub-standard care and consequently, poor patient health outcomes.

“The challenge I would say would be the workload in a way that you find yourself being one midwife and maybe five antenatal patients that you are supposed to progress. You attend the deliveries and do post-natal while there is only three of you on duty; then it becomes a challenge because someone needs to be helped antepartum or while delivering. Some want to push as well; despite the fact that there is no midwife with them. If she is by herself and I am busy on the antenatal side; I won’t be able to see whether she is now bleeding if she is by herself.” (Participant 6, Advanced Midwife)

- Poor record keeping and quality of work

Midwives were unable to keep proper records because of the large patient numbers they had to look after, shortage of staff and the multiple tasks they were doing on a daily basis.

“They are over-stretched, but we expect them to do the right thing – that they know. But you just keep pushing and pushing them. You find one person has to discharge 5-6 patients at one stage, maybe from 08h00 to 10h00 and at the same time she is seeing other patients. And then they have to do other things, like record keeping which is often inadequate and of poor quality. You cannot expect them to deliver services and keep record the way it is expected.” (Participant 15, Operational Manager)

- Lack of supervision and professional development of junior staff

Due to a shortage of staff, interns were left to work alone forcing them to make patient management decisions that were beyond their level of competency.

“And they just said, ‘Oh, you just go here or just go there,’ and it was not clear what the responsibilities of the intern were, especially on call. Sometimes the medical

officers who are supposed to supervise us are not around, so you have to make decisions.” (Participant 18, Medical Intern)

“So, when I came to this department, I expected more responsibilities, a little bit of seniority – however I became just a little more than an intern. I was a little disappointed to be categorized as an intern and not really given more responsibilities. I did my internship before.” (Participant 23, Community Service Medical Officer).

- Negative impact of the well-being of health workers

The poor working environment had negative impact on healthcare workers’ physical and psychological well-being including their personal relationships and social lives.

“You know speaking about staff morale, it’s very low, because you know, sometimes people are over-worked and when you are over-worked you are not happy ...” (Participant 34, Operational Manager)

- Delay in referring patients

Healthcare workers indicated there were delays in referring patients. They attributed this to two factors: the lack of skills and also delay in emergency transport.

“Another challenge, I think, is lack of skills. Some people don’t know when it’s a problem and when to refer; and by the time they refer it’s a bit late, due to delays in diagnosis”. When the correct decision to transfer is made then there are delays in ambulances (Participant 21, Consultant)

6.3.2.4 Coordination of healthcare services

Challenges with the coordination of healthcare services revolved around the lack of adherence to referral pathways as well and prolonged ambulance response time. These issues were discussed in the previous sections and only repeated here to further highlight the critical role that proper coordination of healthcare services plays in ensuring safe and

quality maternity healthcare. Patients were not adhering to referral pathways and this was further worsened by politicians sending out messages that undermined the referrals system. In instances where the referral system worked, delays in ambulances undermined the effectiveness of this arrangement. The quotations below have been repeated to illustrate the above points:

“I don’t know what is happening. Every area has its demarcation, but it’s like we are seeing everyone from every walk of life’ Strenuous! The numbers are exorbitant. You actually have to develop a different working strategy.” (Participant 35, Advanced Midwife).

“I’m going to go back to the referral system. That is a challenge I think in Gauteng. I did my internship in KZN, and in KZN there is a clear outline of what should be in a primary healthcare centre and what should be referred up. And that is also communicated to, let’s say, ambulance personnel. If you call the ambulance to say this is what’s wrong with me, they will monitor you and they will say, no, you are actually not supposed to go here, you are supposed to go there. There are no such thing as just walk-in patients. You come by referral. So, I think by accepting everybody that comes we are also doing a disservice to the patients because instead of reserving our energy for high-risk patient that is going to need our attention, we are seeing things that could have been managed at a lower level.” (Participant 22, Medical Officer)

“Sometimes - I wouldn’t like to put politics into it, but you know - I think politics and whatever we are doing here, you know, are not together; because you know how our politicians on national televisions will encourage people, you know, to come and attend clinic. And then the people come. What they are doing and what they tell patients are in opposition. Like we tell patients to use the services nearer to them, but they (the politicians) are telling them they can go anywhere they want. They say they are promoting patients’ rights.” (Participant 34, Operational Manager)

“One of our biggest challenges is ambulances for transferring patients from different facilities to here. There is a very big delay in timing for arrival, you see the distances in general are not that far, but the time it takes a patient to get from point A to B is a problem.” (Participant 21, Consultant).

6.3.2.5 Leadership and management

Healthcare workers identified the lack of political and managerial support as some of the challenges in delivering quality maternity healthcare services. Instead of supporting healthcare workers, political leaders and managers were perceived to be reactionary, blamed healthcare workers for poor outcomes and also lacked interest in identifying the root causes for poor quality of care.

“You know, with politicians and management, they are more concerned with clinicians providing high quality of care but do not consider the contributing factors for the poor quality of care. They are not staff-orientated, they are more quality orientated and this leaves a gap. It’s like as if the staff is against management and management against the staff. It’s like the communication is only downwards; the down-up communication is not practiced.” (Participant 7, Area Manager).

“I find that management can be quite patronizing and they might not understand how O&G works, and they tend to kind of have a knee-jerk reaction to any kind of adversity, and they do not understand our side of the story, and they do not really care to get our side of story before making complaints.” (Participant 11, Medical Intern)

“I think we are now very stressed and very pressured in the environment that we work in. There is a lot of blame games going around, people always want to shift responsibilities and shifting blame when something wrong happens.” (Participant 20, Registrar).

6.3.2.6 Health outcomes

The imbalance between service demand and supply created an environment that was characterised by overcrowding, overworked and demoralised healthcare workers, all of which resulted in delays in assessing and monitoring patients, increased adverse healthcare incidents and generally poor quality of care. These have been discussed in the preceding sections.

6.4. Site visits

6.4.1 Introduction

Due to time constraints, site visits were restricted to hospitals and three MOUs (Alexander, Discoverer and Hillbrow). All the visits except one (Alexander MOU), were conducted by the principal researcher and the visit to Alexander by assistant researcher. Both researches have been part of the cluster facility visits before and were therefore familiar with what was expected during the sites visits. The assistant researcher has been the scribe on previous facility assessment visits not related to this study. The focus was on infrastructure, flow of patients, general layout and functioning of maternity services. The site visits included interaction with the staff and asking them questions about maternity services related experiences and challenges. Three of the MOUs were among the busiest while the fourth had low numbers of deliveries. Additional information about healthcare facilities in the cluster, including the MOUs which were not visited was sourced from the minutes of the cluster M&M meetings. To assist the researchers, a site visit guide (Appendix T) was used. Guided by the site visit guide, the researchers took notes during the site visits. Following the site visit conducted by the research assistant, a meeting was held between the principal researcher and the research assistance to discuss the interviews and the assistant researcher's observations. These notes were later summarised by the principal researcher, and adding to the notes, the principal researchers' reflection from his own observation and discussion with the research assistant. The main findings from the site visits are outlined below:

6.4.2 Over-crowding

With few exceptions, there were high numbers of patients in antenatal clinics of most of the healthcare facilities which seemed to outnumber healthcare workers that were working in these clinics. This observation was also confirmed by health workers who expressed frustrations with the number of patients they were managing in antenatal clinics, labour and postnatal wards. Perhaps the best evidence of overcrowding was in regional hospitals. We found overcrowded antenatal clinics in CMJAH and all the regional hospitals, some worse affected compared to others. In some of the hospitals, patients were found either sitting on chairs (plastic and sometimes lazy chairs) or sleeping on floor mattresses because of the lack of hospital beds. Some hospitals tried to address this problem by converting any space they could find into wards without the necessary staffing or equipment. During a site visit to a hospital in the City of Johannesburg we found a patient who had just come out of theatre after an emergency caesarean section lying on the theatre stretcher and nursed on in the passage because of lack of space in the ward. The hospital was full. A further walkabout in the same unit uncovered more challenges. Postpartum women (some post caesarean sections) were nursed on lazy chairs and others on floor mattresses. Furthermore, the antenatal clinic at the same hospital was severely overcrowded and only one doctor was running the clinic due to chronic shortage of staff. The doctor indicated that he had to conduct antenatal care and also perform ultrasound examinations on more than 50 high risk patients at the same time. Because of these doctors were rushing through the patients without paying attention to details and there compromised the quality of care provided.

Overcrowding was also noted during a visit to CMJAH. The staff working at the institution indicated that they were on average seeing more than 180 patients at the antenatal clinics on a given day. Some days the antenatal clinics finished at 18h00. Similar overcrowding was observed in the obstetric emergency admission unit. Patients were found sitting on chairs and five patients had been waiting for antenatal ward beds since the previous night. The overcrowding continued even after the hospital created 12 additional antenatal beds in the gynaecological emergency admission unit as well as using postnatal wards to admit excess antenatal patients. Health workers reported that they were managing the extra

wards and patients without additional staff support as this was not part of the official hospital/department plan. The additional beds were not funded.

Similarly, a visit to healthcare facilities in the City of Ekurhuleni identified similar challenges. In one hospital, pregnant women who were undergoing augmentation of labour with oxytocin were found sitting on chairs. The healthcare workers who were working at the institution indicated that the situation made it difficult for them to adequately monitor the patients as required by the protocol. Similarly, patients in labour in another hospital in the City of Ekurhuleni were found standing in a queue while waiting for their turn to be assessed due the lack of labour ward beds and lack of chairs. Overcrowding was also a major problem at LH in the West Rand.

6.4.3 Staff shortages

Shortage of staff was one of the problems that was identified during the site visits. Healthcare workers especially in DHs, RHs, CMJAH and some of the very busy MOUs complained of chronic understaffing. In one hospital in the City of Johannesburg, one doctor was running a high-risk clinic alone, including doing sonar and there appeared to be over 50 patients at the clinic that were waiting to be seen. Some institutions indicated that they were experiencing high staff attrition rate because of the high workload.

6.4.4 Infrastructural challenges

In addition to the lack of beds, there was a clear evidence of infrastructural challenges. Many of the hospitals did not have separate admission and labouring areas. It was not uncommon to find one area divided into antenatal clinic as well as labour wards e.g., DYDH, EH, CMJAH, RMMCH). The infrastructure in some of the hospitals (e.g., SRH, FERH, CH, TMH) appeared old and poorly maintained. In some of the hospitals caesarean section theatres were outside and often far from the labour ward (e.g., FERH). Almost all the regional hospitals were facing elective caesarean section backlogs due to the mismatch between service demand and supply. All the regional hospitals in the CMJAH cluster except one were DHs that were converted to RHs during the restructuring

of healthcare service, however the conversion was not accompanied by changes in infrastructure and if any, very little changes in the staff establishment.

6.4.5. Review of the cluster morbidity and mortality minutes

The review of the cluster M & M minutes provided additional information regarding the functioning of the cluster and existing challenges. The cluster held regular M &M meetings to review maternal mortality and related challenges. These meetings were held monthly between from 2016 to the end of 2019 and thereafter quarterly. Heads of department meetings followed after each M & M cluster meeting. The heads of department meetings were attended by all the heads of department of maternity units, representatives of the DCSTs, and in some cases, clinical managers. These meetings discussed management and general challenges that heads of departments and district specialists' teams were experiencing in their areas of work. Each meeting was followed by an action plan each plan had a timeline and responsible person. These plans were followed through in subsequent meetings or according to the timelines. Any plan that did not succeed was reviewed in subsequent meetings followed by a revised plan. In addition to the heads of department meetings, the cluster held two to three seminar meetings per year to address healthcare worker related knowledge and skill deficits that were identified during the cluster M & M meetings. The cluster M & M also led to the development of a set of conditions that were to be referred to CMJAH directly regardless of where the patient presented. This was some of the strategies that the team put in place to try and prevent unnecessary delays in very high-risk patient referrals. Similar patient referral pathways were created for RHs. There were also regular cluster team building activities and social outings. These activities were directed at building cohesion, promote team work and improve staff morale among the cluster members.

According to the cluster minutes, the top causes of maternal deaths in the cluster included (1) complications of HIV/AIDS, (2) Hypertension, (3) Obstetric haemorrhage, (4) medical and surgical disorders, (5) malignancy and (6) suicide. Among the most common avoidable factors for the maternal deaths in the cluster were delays in patients seeking help, delay in emergency ambulances, lack of skills of healthcare workers as well as sub-

standard management. Delays in inter-facility emergency transport was a consistent and a recurring theme in almost every meeting. According to the minute's, a representative from the emergency transport services indicated that ambulances and staff were no match for the service demand. Some of the ambulances were not functional and were waiting to be repaired.

The cluster minutes recorded overcrowding, high number of non-nationals, lack of human and infrastructural resources, difficulties in accessing blood products, poor access to laboratory services, lack of managerial support, lack of TOP services among the top challenges in the cluster. With reference to non-nationals, there were reports that non-nationals struggled to access healthcare services because of hospitals demanding upfront payment for services. Thus, non-nationals were presenting with emergencies more frequently (the law requires healthcare facilities to attend to anyone presenting with an emergency regardless of the individual's ability to pay). Unfortunately, some of the non-national presented too late to can be assisted. There above suggests that non-national did not delay seeking help but were prevented from doing so because of financial barriers that were placed by Gauteng's healthcare facilities. Delays in seeking help was identified as one of the major contributing factors of maternal mortality among non-nationals. Some of the hospitals, CMJAH for instance, were worse affected and reports from the hospital were that the hospital it was unlikely for the hospital to meet the 2030 SDG of reducing maternal mortality to less than 70 per 100 000 livebirths unless the situation. Non-national contributed a large portion of the pregnant women who were attending antenatal clinics and delivering at this hospital. There were records in the minutes that this issue was reported to the respective CEOs and GDOH however no action was taken by either of the parties. The impression the cluster minutes created was that healthcare workers tried their level best without support from senior managers and GDOH.

There were also records in the cluster minutes suggesting that healthcare workers were experiencing challenges with their managers at facility level. There were reports of the

existence of tensions between clinical managers and heads of department in some of the hospitals. According to the minutes clinical managers making clinical decisions without involving the unit HOD, were doing rounds in maternity units without the knowledge of the HOD and did not respond when extra support was requested (e.g., additional staffing or equipment). There were also report that some of the clinical managers were teaming up with medical officers to undermine the authority of the HOD. Similarly, GDOH did not respond to requests for assistance, including proposals that were submitted by the different stakeholders (hospitals, districts, cluster, clinical governance committee, etc). An example was the Maternal and Neonatal Recovery Plan and the Caesarean Section Hub which were submitted to the province and remain to be implemented more than two years after they were submitted. The cluster resolved in October 2019 to request a meeting with Gauteng's HOD and MEC of health to discuss the frustrations healthcare workers were experiencing in the course of their day to day efforts to provide quality maternity care, overcrowding, chronic understaffing, the impact of payment requirements for healthcare services for non-nationals and the lack of implementation of proposals such as the establishment of onsite midwife obstetric units (OMBUs) to reduce overcrowding in some of the regional hospitals, including the implementation of the caesarean section hub proposal to reduce the chronic caesarean section backlog in the cluster and the province.

6.5 Summary

In this chapter, experiences and perceptions of healthcare workers and their immediate supervisors/managers in the frontlines of maternity healthcare provision were presented. The main and critical issues that were identified revolves around the imbalance between the demand and supply side of availability of healthcare, causes of the imbalance and the impact that the imbalance has on the provision of quality of care, patient experiences of care, patient health outcomes, medicolegal challenges as well as healthcare workers' ability to deliver quality health care, their general wellbeing and morale. Left unattended the above would most likely become obstacles against successful implementation of the NHI and reduce the province's chances of reducing maternal mortality to less than 70 per 100 000 livebirths in order to meet the UN 2030 SDGs.

CHAPTER 7: CONSOLIDATED RESULTS AND DISCUSSION

7.1 Introduction

The provision of accessible, context-appropriate, and cost-effective quality maternity care is central to improving maternal health and reducing maternal mortality. Studies suggest that the high rate of maternal mortality in LMICs is a result of the poor quality of care (Kruk et al., 2018). The poor quality of care is thought to be related to the design way health systems in LMIC are designed and more specifically the functioning and quality of primary healthcare services (Kruk et al., 2018, Roger-DeWan, 2020). Most of the healthcare systems in Africa are based on the PHC model (Oleribe et al., 2019). A five-country study assessing basic maternity healthcare services in Kenya, Namibia, Rwanda, Tanzania and Uganda by Kruk et al. (2019) reported that primary healthcare facilities in these countries were responsible for 40% of the deliveries yet the quality of the healthcare services left a lot to be desired. Similar findings were reported by Kim et al. (2019). The above findings led to in the global calls for new models of healthcare. The calls are for new models of care that area context appropriate and responsive to local healthcare needs and challenges (Hanson et al., 2020).

Kruk et al. (2018) and Roger-DeWan at al. (2020) proposed three interventions that could assist in improving the quality of maternity healthcare services: (1) strengthening of primary healthcare facilities so that they are able to provide high quality antenatal care services, (2) adoption of a hospital-based maternity delivery model to ensure access to high-quality and life-saving technology and (3) improve emergency transport services from home to healthcare facilities. They proposed adopting the above as a package would reduce maternal and neonatal mortality by 50% (Kruk et al., 2018, Roger-Dewan, 2020).

There is global consensus regarding the need to improve access to quality healthcare services in general and maternal healthcare services in particular, however the challenge revolves around finding the most appropriate model of healthcare to achieve this (Kruk et al., 2018; Roger-DeWan, 2020). In designing maternity care, countries should aim to

strike a balance between equity and quality. This can be challenging for LMICs because of competing healthcare needs limited resources and contracted fiscal space (Oleribe et al., 2019). There is therefore a need for innovation. These innovations should focus on designing healthcare service model that would ensure the delivery equitable, accessible, cost-effective, efficient and quality healthcare services. A similar model is needed for South Africa.

7.2 Healthcare services in South Africa

Healthcare system in South Africa has a dark past as a result of apartheid era policies (Coovadia et al., 2009). The election of the ANC-led Government of National Unity (GNU) in 1994 ushered a new era for South Africa. Upon assuming power, the new government soon embarked on a journey of social and healthcare reforms. The purpose of healthcare reforms was to unify the fragmented and inefficient health system in order to create a unitary equitable and accessible healthcare system that is accessible to the South African population. The reforms were made possible through the enactment of new legislations and policies, among those, the White Paper on the Transformation of Health System (DOH, 1997), the Reconstruction and Development Program (RSA, 1994) and NHA (RSA, 2004), among others. These policies and legislations led to the implementation of a DHS model of healthcare delivery as well as a PHC approach. According to Tarimo (1991), a DHS is based on the PHC principles of community upliftment as well as disease prevention and treatment. It is a self-contained health system with a responsibility to plan and deliver healthcare services to a well-defined population within a given administrative and geographical area. The DHS-PHC model has been hailed as the best model for the delivery of integrated healthcare services globally (WHO, 1996).

According to this model, the PHC orientated DHS is the locus of the delivery of healthcare services. The GNU adopted the DHS-PHC model for the following reasons (DOH, 1997):

- Address the fragmentation of the health system.
- Ensure equitable access to quality healthcare services.
- Ensure local accountability and participation of local communities in the design, planning and delivery of healthcare services.

- Decentralise governance of healthcare services.
- Develop and promote intersectoral approach in the management of government and healthcare related services.

According to the RDP (RSA, 1994) and NHA (RSA, 2004), districts are responsible for the management of healthcare services and control of the healthcare budget. District Healthcare Services are responsible for the delivery of comprehensive, promotive and curative healthcare services in line with the PHC approach, to collaborate with governmental (intersectoral) and non-governmental organisations and to build cooperation among the different stakeholders through the establishment of referral networks within and across the healthcare districts and different levels of care (DOH, 1997).

Different provinces and districts have a different understanding of the DHS-PHC model and therefore, implementation is different across the country (EDO, 2015; GDO, 2016; WDO, 2014). The CPF is an example of Gauteng Province's interpretation and adaptation of the DHS-PHC model to suite local context and respond to the province's healthcare needs and challenges.

7.3 The purpose of the study

The aim of the study was to assess the strengths and weaknesses of the organization/configuration of maternity healthcare services in Gauteng, in particular, the CPF as implemented in the CMJAH maternity cluster in order to identify gaps/healthcare barriers and use this information to recommend healthcare services improvement strategies.

In order to assess the strengths and weaknesses of the organisation/configuration of maternity healthcare services in Gauteng Province the study focussed on answering the following questions:

- Is the Gauteng CPF fit for purpose and contextually appropriate to respond to maternity healthcare needs, challenges, causes and contributing factors of preventable maternal deaths in the province?

- Has the CPF been fully implemented?
- Has the CPF been effective in supporting maternity healthcare services and responding to the causes and contributing factors responsible for preventable maternal deaths?

The above questions resulted in the following objectives, which were answered using the CIPP model and integrating the results of the quantitative and qualitative components of the thesis:

- To describe the organization/configuration of maternity healthcare services in Gauteng and the impact of the provision of maternity healthcare services and maternal deaths.
- To explore and describe health care system barriers and enablers in the provision of maternity healthcare in Gauteng.
- To explore and describe the experiences and perceptions of frontline healthcare workers and their immediate supervisors/managers regarding the functioning of maternity healthcare services in the province.
- To use the study's findings to gain insight into the challenges facing healthcare services in the province.
- To use the study's findings to recommend maternity healthcare and general healthcare services improvement strategies.

7.4 Triangulation of quantitative and qualitative results

In order to achieve a comprehensive assessment of the state of healthcare services, healthcare services assessment and evaluation models should include context, input, process and outcome of care (Kruk et al., 2018). Stufflebeam's CIPP model was identified as an ideal model for this purpose. The main advantage of this model is in the ability to align input, process, and product with the context (Stufflebeam, 2003). In this way, one can assess whether the healthcare intervention is appropriate and responsive to the context, including contextual health needs and challenges.

The convergent mixed method research is regarded as the most appropriate method to study complex healthcare services (Lorenzini, 2017; Vedel et al., 2019). In this study, the Convergent Mixed Method Research design provided the researcher with an opportunity to answer the research questions using multiple perspectives and more than one sources of data. At the end, the quantitative and qualitative components collaborated to provide a much clearer picture regarding the strengths and weaknesses of the organisation/configuration of maternity services than would have been possible using quantitative or qualitative research approaches alone. The two forms of data were triangulated according to the framework suggested by Creswell and Plano Clark (2007). This approach involves independent collection, analysis and presentation of quantitative and qualitative data and later combining the results to answer research questions and meet the research objectives in a process called triangulation. The integration or triangulation occurred through synthesis of the results of the quantitative and qualitative components. According to the University of Minnesota, synthesis involves combining two or more different components to construct a complete picture of a phenomenon of interest https://umanitoba.ca/faculties/nursing/students/What_is_synthesis.pdf). It's like putting together the different parts of the puzzle. This process is graphically represented in Figure 7.1. The main research questions and research objectives are discussed next.

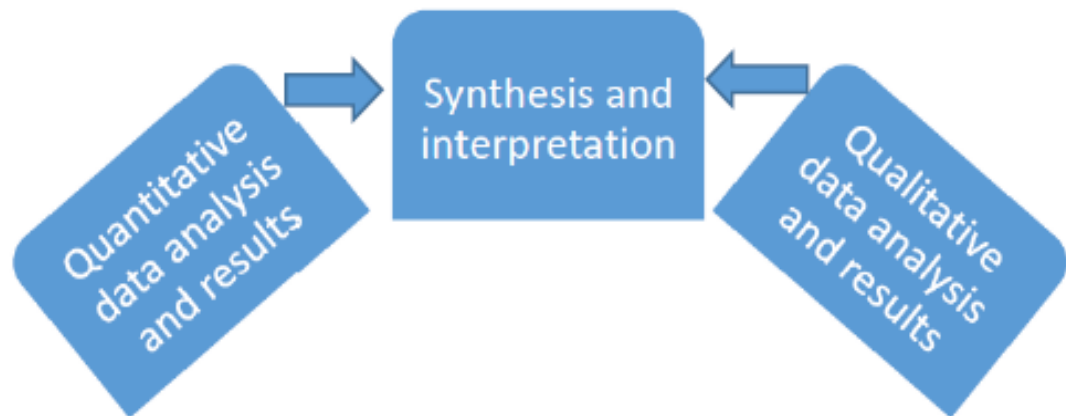


Figure 7. 1: Triangulation in convergent MMR study

(Adapted from Creswell and Plano Plano Clark, 2007)

7.5 Is the Gauteng CPF fit for purpose and contextually appropriate to respond to maternity healthcare needs, challenges, causes and contributing factors of preventable maternal deaths in the province?

In order to answer the above question, we first describe the organisation of maternity services in Gauteng and thereafter address whether this arrangement is fit for purpose and contextually appropriate. This is important given the evidence that the death of a mother during pregnancy is a result of the failure of the health system (Roger-DeWan et al., 2020; Tibandebage and Mackintosh, 2010). Therefore, the knowledge of the organisation and functioning of maternity health services could assist the stakeholders in determining the contextual factors that contribute to the maternal deaths.

7.5.1 Organisation of maternity healthcare services

Maternity services, like the rest of healthcare services in Gauteng are organised in the form of clusters as outlined in the CPF (Appendix V). The CPF is based on a primary and district healthcare approach. Like most LMICs, healthcare in South Africa is based on

PHC philosophy and healthcare services are delivered through the DHS. PHC approach is the preferred model for healthcare globally, and more so for countries that aspire to achieve universal healthcare coverage (Macinko et al., 2009; Tsimsiou, 2017; White, 2015; WHO, 2008; WHO, 2010; WHO, 2018). The adoption of the CPF is perhaps Gauteng Province' statement of its commitment to strengthen the DHS-PHC model instead of centralising maternity services to hospitals (Kruk et al., 2018; Roder-DeWan et al., 2020). Retaining the PHC approach and DHS delivery platform has many benefits, among those, provision of cost-effective, promotive and curative healthcare services as well including access to institutional deliveries, a major challenge in LMICs factors for poor maternal outcomes in LMICs (Tegegne et al., 2018).

There is evidence in support of the cluster approach. For example, the implementation of a cluster approach in Hungary improved both access and quality of healthcare services (Jakab, 2013). Like the CPF in Gauteng, PHC facilities were points of entry into the Hungarian health system. Patients with complex condition and those who needed services that were not available in primary healthcare facilities were referred to the higher level of care. This is similar to the CPF. Although the two cluster models are similar in philosophy and principles, they differ in terms of context, governance and coordination of healthcare. The success of cluster model in Hungary does not suggest that it will automatically succeed when applied in different setting. Context is critical.

Retaining the primary healthcare approach in Gauteng was a progressive step. The PHC approach and DHS have improved access to healthcare in South Africa (Coovadia et al., 2009; DOH, 2014b). The PHC and DHS model in South Africa emerged out of the need to address the decades of social inequities and injustices that was created by the apartheid regime and improve access to healthcare services for the marginalised. Post 1994, the democratically elected and ANC-led government inherited a highly divided society, a fragmented healthcare system and a disproportionate burden of disease (and maternal deaths) in the Black African population (Coovadia et al., 2009).

According to Baker (2010), the private healthcare sector was the most dominant force in South Africa during apartheid and the public sector which served the majority of the South African population was mostly urban orientated, hospicentric and of questionable quality. In terms of inequality and access to social resources, healthcare services were organised along racial lines with White South African at the top, followed by Indians, Coloured and Blacks at the bottom in terms of access and the quality of healthcare services that the apartheid government provided for the different groups (Baker 2010). To address this inequality, the democratically elected government adopted a PHC approach with the DHS as its healthcare delivery platform to ensure that healthcare services were delivered in an equitable, efficient and cost-effective manner (DOH, 1997; RSA, 2004). The purpose of the DHS-PHC approach was to improve access to healthcare services by the needy, encourage community participation in the planning, delivery, and monitoring of healthcare services, ensure multisectoral collaboration, improve efficiency and responsiveness of healthcare services to local needs and decentralise the management and governance of healthcare services to districts (DOH, 1997; RSA, 2004).

Unfortunately, the PHC and DHS model of care did not escape challenges. The slow progress in achieving optimal reduction in maternal mortality in LMICs has been attributed to the failure of the PHC-DHS model, in particular, its poor quality of care (Hanson et al., 2020; Kim et al., 2019; Kirigia and Barry, 2008; Kruk et al., 2018; Roger-DeWan et al., 2020; Thwala et al., 2019). Similar findings have been reported in South Africa (DOH, 2004; Malakoane et al., 2020; Maphumulo and Bengu, 2019; Presidency South Africa, 2019; Rispel, 2016; South African Lancet Commission, 2018). In South Africa, the PHC and DHS approaches improved access to healthcare services but failed to improve the quality of care (Baker, 2010; DOH, 2014, Lancet Commission, 2018; Malakoane et al., 2020; Maphumulo and Bengu, 2019; Rispel, 2016). This finding is not unique to South Africa but common to other African countries (Oleribe et al., 2019). Lack of resources (healthcare personnel and infrastructure), equipment, medications, poor management and weak leadership are among the main drivers for the poor quality of care (DOH, 2014; Malakoane et al., 2020; Maphumulo and Bengu, 2019; Oleribe et al., 2019). The above speak directly to the WHO's health system building blocks (WHO, 2007).

The South African Government adopted a new strategy, the NHI was directed at ensuring universal access to quality healthcare for its population. The new strategy involved three phases (Michel et al, 2020):

- Phase 1: improving the quality of public healthcare services. This phase had two components: (1) Establishing an Office of Healthcare Standard (OHSC) to audit the compliance healthcare facilities against a set of agreed standards in order to improve the quality of healthcare services and (2) PHC reengineering. This phase had to be completed between 2012 and 2016.
- Phase 2: NHI bill. The years 2017 to 2021 were set aside for the development, finalisation and approval of the NHI bill. The NHI bill addresses funding mechanism, service packages, NHI governance and administration, among others (DOH, 2015b). It was also anticipated that this phase would also include purchasing of healthcare services for the most vulnerable groups such as women, children, elderly and people with disabilities.
- Phase 3: It was envisaged that the third and final phase which involved implementation of a fully-fledged and functional NHI, would commence in 2022 and completed by 2025.

Based on the above, the CPF, upon which the organisation of healthcare services in Gauteng is based, could be viewed as part of the PHC re-engineering in order to strengthen healthcare services in the province (GDOH, 2019a). If successful, the Gauteng Province would be ready for the final implementation of the NHI.

The CPF divided healthcare services in Gauteng into four clusters named after central hospitals (CHBAH, CMJAH, DGMAH and SBAH). Each central hospital in Gauteng is named after a political stalwart. A cluster refers to the aggregation of healthcare facilities from different levels of care around a central hospital (GDOH, 2019a). The purpose of the cluster management has been previously discussed and as outlined in the CPF (Appendix V):

- To strengthen district healthcare services and ensure that PHC services are the first entry points into the health system.
- To create continuity of care and improve patient's experience of care.
- To support the standardization of care across Gauteng health facilities.
- To expand the academic training platform, create a platform of interaction and support between academic hospitals and other care levels.
- To improve quality of care through the creation of learning communities to improve patient health outcomes.
- Improve clinical care and clinical outcomes.
- Apply system thinking in the management of health services.

Improving maternal healthcare services and reducing maternal mortality require a health system approach (Conlon et al., 2019). Judging from the objectives of the CPF, the purpose of the cluster arrangement was not to replace the PHC-DHS model, instead, the purpose of the CPF was to strengthen healthcare services in the province through strengthening of the PHC approach and supporting district healthcare services (GDOH, 2019a). One of the unique features of the CPF is its attempt to establish collaboration among health districts which if successful would facilitate pooling together of healthcare resources and improve both the districts buying powers as well as service delivery. Secondly the CPF recognised the importance of linking service delivery with health professions through the inclusion of medical and nursing schools among key stakeholders.

It is indisputable that the PHC approach has gone a long way to improve access to healthcare access in LMICs (Macinko et al., 2009). The PHC approach had partial success in South Africa. There is no doubt that access to healthcare services in South Africa has improved, however this improvement was not simultaneously accompanied by improvement in the quality of healthcare services (DOH, 2014b; Michel et al., 2020). Majority (84%) of the South African population who are depended on the public healthcare services for healthcare continue to experience poor quality of care to this date (Michel et al., 2020). It therefore does not come as a surprise that the strengthening of the PHC and

district healthcare services was identified as priority and one of the key interventions directed at improving the quality of healthcare in Africa (Bresick et al., 2019; Bryant et al., 2009). The CPF as a health innovation was therefore a welcomed development.

Furthermore, the CPF claims to draw its mandate from the Constitution of the Republic that require National and Provincial Departments of Health to establish healthcare services and to ensure that healthcare services are accessible and provided within available resources (GDOH, 2019a). Indeed, the GDOH's CPF falls within the legislative provision of Section 27 of the Constitution that mandates the government to take reasonable steps, including legislations, to ensure a progressive realisation of the right to access healthcare services (RSA, 1996). Access to maternal and reproductive healthcare services is included in this section.

The CPF is based on principles of collaboration and participation of key stakeholders that are involved in the delivery of healthcare services in Gauteng. These stakeholders are tasked with ensuring that healthcare services in the province are properly managed, coordinated and efficiently operated in a cost-effective and equitable manner (GDOH, 2019a). Secondly, stakeholders must make sure that healthcare facilities function according to their classification (CHC/MOU, DH, RH, tertiary and central hospitals) and adhere to their service packages (GDOH, 2019a; GDOH, 2019b). More importantly, the health system should be managed to ensure adherence to referral pathways and utilisation of primary healthcare services as points of entry into the health system. Efficient management of the CPF and adherence to referral pathways were some of the factors that have been identified as critical for the success of the CPF (GDOH, 2019a). The following stakeholders form part of the CPF stakeholders:

- Central, regional and district hospitals
- District Healthcare Services (DHS)
- Emergency Healthcare Services (EMS)
- Hospital boards and clinic committees
- GDOH Hospital Directorate

- Universities and Nursing Colleges

By merely looking at the list of stakeholders, the CPF attempts to integrate healthcare services and create a continuous healthcare system by connecting different levels of care and establish clinical governance and accountability. The CPF expect clusters to use data to monitor and improve healthcare services, adhere to the hierarchical arrangement of healthcare facilities during patient referrals, implement standardised protocols, conduct morbidity and mortality audits and adhere to Essential Medicine and Equipment lists (GDOH, 2019a; GDOH, 2019b). Properly applied, the cluster approach has the potential to improve the efficiency, coordination and quality of healthcare services through the consolidation of services and concentration of valuable and scarce resources to higher levels of care while at the same time decentralising less scarce resources to primary healthcare services and lower levels of care (GDOH, 2019a). This is critical for the success of the NHI.

Returning to the question that was posed in the beginning of this section one can say that in principle, the organisation of maternity services in the form of clusters is in line with the Constitution of the Republic, its rationale is supported by evidence and also in line with the government's strategies to strengthen healthcare services in preparation for the NHI backed by evidence (Jakab, 2013; Michel et al., 2020; Oleribe et al., 2019; RSA,1996).

7.5.2 Is the organisation of maternity services in the cluster fit for purpose, contextually appropriate and able to respond to maternity health care needs and challenges?

This question is best answered in three (1) fit for purpose or appropriateness of the service organisation, (2) The impact of the service organisation of maternity healthcare needs and maternal health challenges and, (3) Challenges/ maternity healthcare service barriers.

7.5.2.1 Fit for purpose or Appropriateness of the organisation of maternity healthcare services?

CMJAH cluster arrangement is appropriate to the needs and challenges. The study was limited to facilities conducting deliveries (MOUs, DHs, RHs Provincial Tertiary/Central Hospitals). As discussed previously, the CMJAH cluster is made up of 38 healthcare facilities that are spread across three healthcare districts and different level of care. There were 15 primary healthcare clinics, 11 CHCs/MOUs, six DHs, four RHs and one tertiary hospital that does not provide maternity care and one central hospital.

In terms of the of MOUs, there were three MOUs in the City of Ekurhuleni, four in the City of Johannesburg (the fifth opened on the 28th of January 2020) and three in the West Rand District. The estimated average traveling distances between MOUs and referral hospitals were 15.2 km (7.5-26.9), 14.3km (4.6-38) and 16.4km (11.1-21.7) in the City of Ekurhuleni, the City of Johannesburg and the West Rand District respectively. The corresponding estimated average travelling time was 18.3min (12-25) for the City of Ekurhuleni, 16 min (6-37) for the City of Johannesburg and 18min (12-23) for West Rand District. OR Tambo (City of Johannesburg), Phillip Moyo (City of Ekurhuleni) and Bekkersdal (West Rand District) MOUs were the furthest from their referral hospitals at 37km, 26.9km and 21.7km respectively.

The data above suggests there was a reasonable mix of the different levels of care with more and the number of the different levels of care appear to be in line with the philosophy of the CPF (primary healthcare as entry points into the health system and those requiring services that is not offered at this level referred to the appropriate level of cure. Furthermore, all the MOUs were within reasonable distance from referral centres/hospitals and therefore a welcome finding. The main problem with MOUs were differential performance. All the MOUs in the City of Johannesburg except Discoverers were extremely busy. In the City of Ekurhuleni one MOU, Phillip Moyo carried the heaviest load. Similarly, Bekkersdal was the busiest MOU in the West Rand District. As discussed previously there were three MOUs that had the lowest numbers of deliveries – Kwa-

Thema in the City of Ekurhuleni, Discoverers in the City of Johannesburg and Khutsong in the West Rand District.

The Cities of Johannesburg and Ekurhuleni had one district hospital each compared to two in West Rand District. SRH was not able to perform caesarean sections on weekends and public holidays and patients needing caesarean sections were referred to CMJAH because of shortage of staff. There was in total, six regional hospitals in the cluster: three in the City of Ekurhuleni, two in the City of Johannesburg and one in the West Rand District. As discussed earlier, the highest number of deliveries were in the City of Johannesburg followed by the City of Ekurhuleni. In terms of the number of maternity beds in the cluster, 39%, 31%, 17.4 %, and 13% were in RHs, DHs, MOU, and CMJAH respectively. Most of the healthcare facilities were overcrowded and working beyond capacity. There were no dedicated obstetric critical care beds in the cluster. Pregnant women had to compete for general critical care beds which were also in short supply. Similarly, obstetric high care beds were in short supply. The distribution of maternity beds was skewed towards RHs. This level of care was responsible for 54% of the total deliveries in the cluster.

The estimated average distances and travelling time between DHs and referral hospitals were 21.2 km (9.3-51.3) and 21.5 min (13-43min). The DH that was closer to its referral centre was SRH (City of Johannesburg) and Carletonville Hospital in West Rand District was the furthest. Similarly, the average distance and travelling time between DHs and CMJAH (tertiary referral centre) were 39km ((13-80) and 38 min (16-60). Once more Carletonville hospital was the furthest from CMJAH. The closest DH to CMJAH was SRH. The estimated average distance and travelling time between SRH and CMJAH were 31.5km (8.4-58.8) and 30 min (12-46). RMMCH was the closest regional hospital to CMJAH and FERH the furthest. From the above it is clear that most of the hospitals were within reasonable travelling distance and time from each other. The furthest hospital was 80km away with an estimated travelling time of 60 minutes.

There cluster arrangement is in line with section 27 of the Constitution of the Republic (RSA, 1996), NHA (RSA, 2004), White Paper on the Transformation of the Health System (DOH, 2007) as well as the aspirations of the NHI bill (DOH, 2015b). This arrangement is also in line with the government's strategy on PHC reengineering (Michel et al, 2020). The hierarchical arrangement, spread and distances between different levels of care and the collaboration between different stakeholders including districts, presents the CPF as a strong health innovation with potential to improve access to quality healthcare and improve the efficiency of healthcare services. It can be argued that the design and philosophy behind the CPF makes this model suitable for low resource settings and also an attractive strategy to facilitate the delivery of universal health coverage (UHC). There are existing challenges however these challenges do not negate the evidence in support of the design as well as the CPF's potential to support the Gauteng Province in achieving the UHC.

7.5.2.2 Impact of the service organisation on maternity healthcare needs and challenges

By bringing together different role players under one roof in the form of a cluster, CPF achieved the objective of establishing clinical governance, accountability, and improving the coordination of maternity healthcare services in the cluster. In terms of clinical governance, the cluster arrangement led to the implementation of standardised treatment protocols, regular maternal morbidity and mortality meetings as well as regular training and continuous development of staff. Furthermore, the cluster arrangement created a platform through which cluster members from different professional groups, levels of care and health districts could collaborate, assist and support one another. There was regular Judging from the attendance registrars, the M & M meetings were regularly attended by representatives of the main stakeholders that are listed on the CPF. Healthcare workers also confirmed during the interviews that the cluster system brought in much-needed support, professionally and socially. The cluster collaboration improved the transfer of patients between healthcare facilities and saw a slight but sustained gradual reduction in maternal mortality over time. The following are examples of the impact on service delivery that was brought about by the introduction of the CPF:

- A senior midwife from CMJAH labour ward was transferred to OR Tambo MOU on a post funded by CMJAH when the MOU opened for the first time.
- CMJAH consultants have been covering the afterhours calls at Edenvale since 2016 because of the shortage of staff.
- The HOD of PH was transferred to FERH to assist in the running of the department of Obstetrics and Gynaecology because of the staff shortages at FERH

The above is by no means an exhaustive list.

7.5.2.3 Challenges / maternity healthcare service barriers

As discussed previously, most of the healthcare facilities in the cluster were on average more than 5km from referral the referral centres. Hanson et al. (2015) studied the impact of distance from home to healthcare facilities in Tanzania. The authors reported four times increase in maternal mortality when a pregnant woman travelled a distance of more than 5km from home to a healthcare facility. Similarly, Ravelli et al. (2010), in the Netherlands, found an increase in maternal mortality among women who travelled for 20 minutes or more from home to hospitals. Both the studies looked at the impact of distance from home to healthcare facilities.

The impact of interfacility distance on maternal health outcomes is unlikely to be similar to that from home to a healthcare facility as healthcare facilities should be able to stabilise the patient before transfer. Therefore, longer distances between facilities might have less negative impact of health outcomes when compared to distances from home to healthcare facilities. Data regarding distances from patients' home to healthcare facilities was not available for the study. However, national data suggests that 90% and 67% of the South African population live within 7km and 2km from a public healthcare facility (DOH, 2014). Based on this data, an assumption can be made that at least 2/3 of the study population were likely to be living within 2km of a healthcare facility and 90% within 7km. According to Kruk et al. (2018) poor quality of care is a major contributing factor for poor maternal outcomes where distance is not a problem. In a study conducted in

Southern Tanzania, Hanson et al. (2015) found poor quality of care to have contributed to the death of women who lived within 5km of the hospital. Based on these studies, living within 5km of a healthcare facility does not guarantee survival.

The above is true for the CPF. The promise and aspirations of the CPF were limited by the poor quality of care – a result of the imbalance between the demand and supply side of maternity healthcare services. There high demand for healthcare services in most of the healthcare facilities especially RHs, CMJAH and some of the MOUs that were located in high population density areas. The increase in patient numbers was driven by a number of factors- cross border and interprovincial migration, lack of adherence to referral pathways, poor coordination and inefficient use of available resources (some of MOUs had very low case load yet equivalent number of staff compared to overcrowded MOUs). Healthcare facilities in the cluster were experiencing high levels of overcrowding because of this imbalance. There was also an inequity in the distribution and chronic shortage of healthcare resources (infrastructure, human resource, consumables, etc). This finding is not unique to the cluster but a general challenge in the South African public healthcare sector (Malakoane, 2020; Maphumulo, 2019; Michel et al., 2020).

The historical racial-based allocation of resources during apartheid and post political transition the lack of political commitment, inefficient and corrupt leadership, poor management and the country's weak economic, are among the factors that that contribute to the chronic shortage of resources within the health system (Malakoane, 2020; Maphumulo, 2019; Rispel, 2016; Rispel et al., 2019). The lack of adequate resources had multiple consequences. First, patients were not managed at the appropriate level of care as envisaged by the CPF.

RMMCH, though a regional hospital, operated as an MOU, district, regional as well as tertiary hospital. This hospital experienced the worst form of overcrowding in the cluster in addition to chronic water shortages and elective theatre lists that went for days (the staff indicated that it was not unusual to find 50 to 60 patients waiting for elective

caesarean sections and unfortunately some of the women ended with stillbirths while waiting for their turn). Low risk patients from surrounding areas were delivering at this hospital as there was no MOU or a district hospital in the area. The staff at RMMCH estimated that 60% of the patients delivering at the hospital were low risk patients. Secondly, in the absence of a district hospital in the area, RMMCH functioned as a referral hospital for two MOU's (Discoverers and OR Tambo). OR Tambo was one of the busiest MOUs in the cluster. Thirdly, RMMCH was also taking tertiary referrals from LH however, CMJAH took over this function as RMMCH battled with overcrowding and high numbers of maternity deliveries. Interestingly RMMCH was the only specialised mother and child hospital in Gauteng. The department of Obstetrics and Gynaecology at this hospital had three Maternal and Foetal Medicine subspecialists as well as a fellow in Maternal and Foetal Medicine. These highly skilled individuals found themselves managing a high number of low-risk patients instead of providing much the needed highly specialised services. Like other hospitals in Gauteng, RMMCH is constantly on divert (temporary closure to relive pressure on the health system- can be called the 'load shedding' of healthcare facilities). Hospital diversions are common in Gauteng. There were 5347 hospital diversions in a period of 9 months in Gauteng in 2019 (Bloem, 2019).

CMJAH faced similar challenges. In addition to its central hospital functions, the hospital operated as an MOU, district and a regional hospital. CMJAH was the main hospital that provided sub-specialist services for the Gauteng South region (some subspecialist services were also provided at CHBAH and RMMCH) yet, the hospital was delivering low risk patients from surrounding areas, functioned as a referral hospital for Hillbrow MOU (and to some extent, Alexander MOU), including the MOUs' clinic networks. In addition, CMJAH functioned as a referral hospital for SRH. SRH operated as an MOU during weekends and public holidays referring all patients requiring district level hospital services to CMJAH, in response to this shortage. As a result, CMJAH experienced high patient load which was beyond its capacity. Pregnant women had to sit on plastic chairs for hours to days while waiting for a bed to be available. There were delays in attending to patients especially those who needed caesarean sections and like the situation reported in RMMCH, some of the pregnant women suffered adverse pregnancy outcomes while

waiting for elective caesarean sections. This situation resulted in high numbers of patient complaints and high burden of medicolegal cases.

Similar problems were found in most of the other cluster healthcare facilities. On average, the CMJAH cluster was conducting around 76 000 maternity deliveries per annum, 54% of which were in RHs. As observed during site visits, almost all healthcare facilities, more especially RHs, were overcrowded. Chances are also high that most of these facilities did not meet the maternity facility infrastructure requirement standards as outlined in the Maternity Care Facilities Standard/Guidance that had been put together by Infrastructure Unit Support System (IUSS) in terms of layout, physical space, patient flow and safety standards (IUSS, 2014). In some of the RHs, maternity theatres were outside maternity units (e.g FERH, EH, TMH, PH). This arrangement created delays and inefficiencies in terms of turnaround time during performance of caesarean sections. Some of the RHs were originally DHs that were reclassified into RHs; however, the reclassification was not accompanied by changes in infrastructure and very little changes if any, in staff establishment.

It is important to take note that the problem of overcrowding in public healthcare facilities was not only confined to hospitals in Gauteng, overcrowding in healthcare facilities were and still remains a major problem across the country (Bateman, 2010; Bloem, 2019; McIntyre, 2012). The Former Minister of health, Dr Aaron Motsoaledi, was quoted by the media in 2018 to have acknowledged that there was a critical shortage of hospital facilities in Gauteng (Dlamini, 2018). According to this media report the province needs six more hospitals to manage the escalating patient numbers and address the infrastructure backlog. Others have suggested that Gauteng needs around 2000 additional hospitals which requires province six billion Rands to build (Bloom, 2020). This number is probably an exaggeration however there is no doubt that the healthcare facilities in Gauteng healthcare facilities are no match for the province's health needs and challenges.

Healthcare workers singled out cross border and interprovincial migration as well as lack of adherence to referral pathways as the main drivers for the increase in patient load in the cluster's healthcare facilities. International migration is a global phenomenon with social, health and economic consequences (Kivisto and Faist, 2009; Vearey, 2014; Vearey et al., 2017). International migrants constitute around 3.3% of South Africa's population, 7.4% of which settle in Gauteng (Stats SA, 2015; Stats SA, 2016; Stats SA, 2019; Vearey, 2014; Vearey et.al., 2017; Vearey and Nunez, 2010). This number is likely to be higher when undocumented migrants are included. Non-nationals contributed 27.3% and 36.4% of antenatal clinic attendance and labour ward deliveries in CMJAH during the three-year study period. At RMMCH and SRH, non-national contributed 40% and 60% of the total deliveries respectively. Similarly, non-nationals contributed 34% of total deliveries in DYDH in 2017, 23% and 34% of deliveries and antenatal clinic patients in EH in 2019. These figures suggest that non-nationals make a great proportion of the women seeking maternity care in Gauteng.

The majority of the international migrants come to South Africa for economic reasons, however others were fleeing from civil wars (Vearey et al., 2010; Vearey, 2014). South Africa offers better prospect for a better life among countries in the SDAC region, hence a preferred destination for most of the migrant population from this region because of the country's political stability and better economic conditions (Munyaneza and Mhlongo, 2019; Segatti, 2011). A greater portion of the migrants coming into South Africa are women (Mbiyozo, 2018). In addition to international migrants, Stats SA (2019) projected that Gauteng will have received 1 643 590 internal migrants from other provinces between 2016 and 2021. The high rate of interprovincial migration is due to the economic imbalances that was created during the apartheid era (Bakker et al., 2006; Coovadia et al., 2009). People from poor provinces migrate to richer provinces such as Gauteng in search for jobs and better life. The projection is that 71.3% and 80% of the South African population will live in cities by 2030 and 2050 respectively Mlambo (2018). The majority of international and internal migrants settle in Gauteng. This projection should assist Gauteng in planning for its social and healthcare-related services. A study conducted by Vearey et al., (2018) in PHC facilities in Gauteng reported that 45% and 22% of PHCs

users were cross-border and internal migrants, respectively. Data supplied by some of the cluster healthcare facilities, migration statistics (Stats SA, 2019) and the study by Vearey et al. (2018) supports healthcare workers' perceptions that cross-border and interprovincial migration are contributing to the high patient load in Gauteng healthcare facilities.

There are conflicting research findings on the impact of migrants on the healthcare systems of host countries (Moullan and Jusot, 2014; Rubalcava, et al., 2008; Vearey et al., 2017). According to Vearey (2014), migrants tend to be healthier than the host country's population and therefore do not exert additional burdens on the host country's healthcare system. This view is supported by Fennely (2007) from the US. In contrast, Constant et al. (2015) reported that migrants arrived in the country in less healthy conditions when compared to locals. A study conducted by Rubalcava et al., (2008) in Mexico could also not confirm the 'healthy immigrant' effect. The study by Moullan and Jusot (2014) reported mixed results. This study found migrants to have a poor health status when compared to locals in Belgium and France and the opposite in Spain. These findings led the authors to conclude that the differences in health statuses that have been reported between migrants and locals reflected the health status of the migrant population at the time of leaving their home countries and the extent of their integration in the host country (Moullan & Jusot, 2014). Gimeno-Feliu et al. (2015) suggests that migrants arrive in the host country in healthy conditions however, their health deteriorates over time due to social and economic factors such as lack of access to social services, job opportunities and poor living conditions. A study by Shortall et al. (2015) reported that migrant women were denied access to antenatal care services in the UK. The conclusion drawn from these studies is that the impact of migrant population on the healthcare services of the host country depends on both their health status at the time of leaving their home countries, the extent of the integration in the host country and access to social and healthcare services in the host country. Unlike men, women do not only use healthcare services only when they are sick, they require access to healthcare services for pregnancy and reproductive healthcare services. This suggest that ill health is not the only factor that determine women's utilisation of healthcare services.

Managing migrant population was not without challenges. Health workers faced a number of numerous challenges when caring for this group of women. Language barriers, cultural differences, and managing disease unfamiliar conditions (e.g., sickle cell anaemia), were among the challenges. Health workers struggled to obtain adequate history to make an accurate diagnosis and formulate appropriate management plans because of the language barriers. Similarly migrant women were not able to advocate for themselves. A systemic review by Fair et al. (2020) reported that language barrier has a negative impact on the quality of care as healthcare workers are unable to gain adequate information that they need to make correct diagnosis, including formulating clinical management plans.

Non-nationals in South Africa face additional barriers in the form of the requirements for payment for healthcare services and also treatment denials if they are undocumented (Chikero and Ross, 2018). There are also reports of those non-nationals are subjected to abuse and mistreatment within the South African healthcare system (CORMSA, 2009; Honikam et al., 2015; Makandiwa and Vearey, 2017). This practice is in direct contrast with the provisions of the Constitution of the Republic (RSA, 1996), the NHA (RSA, 2004), Refugee Act (RSA, 1998) and 2007 Revenue Directive from the National Department of Health (DOH ,2007). The South African Constitution guarantees access to healthcare services (including maternal and reproductive healthcare services) for everyone without referring to a person's citizenship. Similarly, the NHA confirms that everyone in South Africa has access to primary healthcare services.

Furthermore, the NHA makes provision for free healthcare services for pregnant and breastfeeding women and children under the age of regardless of the level of care (RSA, 2004). The Refugee Act confirms that refugees (and asylum seekers), like South African citizens, have the right to access healthcare services in South Africa (RSA, 1998). The problem with the Refugee Act is the requirement for healthcare workers to establish the legal status of non-nationals before rendering healthcare services outside an emergency setting. In addition, the Act requires healthcare workers to report any suspected illegal immigrant to the Director-General of Home Affairs (RSA, 1998). The above suggest that

the Refugee Act expect healthcare workers to function a gatekeeper in addition to providing healthcare services. Such expectation creates an ethical and moral dilemma for healthcare workers who have taken an oath that they will always act in the best interest of the patient. By denying migrant patients access to healthcare services or reporting them to the Director-General of Home Affairs healthcare workers would not be acting in the best interest of the patient. Lastly, the 2007 Revenue Directive from the Department of Health gave refugees and asylum seekers the right to access antiretroviral and TB treatment regardless of whether they have permits or not (DOH, 2007). Based on the above, migrant women have access to free maternity, reproductive, HIV and TB healthcare services (DOH, 2007; RSA, 1996; RSA, 2004).

South Africa is a signatory to international and regional statutes on refugees and asylum seekers. Yet, refugees and asylum-seekers continue to face obstacles when accessing healthcare in South Africa (Alfaro-Velcamp, 2016). Part of the problem is the vacuum created by the inconsistencies between Section 27 of the Constitution and the Refugee Act which generates multiple interpretations by hospital CEOs and clinical managers regarding non-nationals' access to hospital services. There is also the negative public attitude against non-nationals based on the perception that non-nationals are competing with South Africans for jobs and also depleting the country's resources (Alfaro-Velcamp, 2017). These factors could have an impact on the ability of non-national to access healthcare services in South Africa. In this study non-nationals contributed 45% of the total maternal deaths and 55% HIV-related maternal deaths at CMJAH in 2019. This is example illustrates that non-national contribute a significant proportion to the maternal deaths in South Africa, and most likely a reflection of a much bigger problem. Both cross-border and interprovincial migration are projected to increase in the coming years and Gauteng Province will remain the preferred destination for the majority of the migrant population (Stats SA, 2016). There is therefore an urgent need for the key players in government and healthcare sector to factor in cross-border and interprovincial migration in future plans for healthcare services, including removing all the obstacles that non-national face when accessing healthcare services in the public sector.

Population growth and non-adherence to referral pathways put additional pressure on the health system in the province, further exacerbating the mismatch between the supply and demand side of healthcare services. Patients were also bypassing primary healthcare facilities to seek help in regional and tertiary hospitals. This finding was in contravention to the CPF and the provincial referral policy (GDOH, 2019a; GDOH, 2019b). Healthcare workers put the blame squarely on political messaging and lack of enforcement of referral pathways. Healthcare workers were accusing politicians of telling patients they can choose where they would prefer to receive healthcare services while at the same time insisting to healthcare workers that patients must start at primary healthcare facilities and be referred to RHs and tertiary hospitals according to their needs. This was not the situation in the CMJAH cluster. Low risk patients presented in regional and tertiary facilities either because of the lack of lower levels of care in the drainage area or simply out of choice. Studies investigating why patients bypass PHC facilities cited poor quality of care which is mainly driven by a lack of resources (infrastructure, drugs, healthcare workers) and perceived lack of skills among healthcare workers working in those PHC facilities (Kruk et al., 2009; Kruk et al., 2016; Kruk et al., 2017). Lack of resources came out strongly as a major barrier against the provision of quality maternity healthcare services during the interviews with healthcare workers. The lack and unequal distribution of resources is a common problem in LMICs and has been blamed for the poor quality of healthcare in these countries (Boex et al., 2019; Oleribe, 2019). It was reported that in 2020 that South Africa needed about 9 billion South African Rands to close the hospital infrastructure backlog (Bloem, 2020). Shortage of resources remains one of the obstacles against CPF' success.

While the study did not include interviews with patients to establish the reasons they bypassed primary health care facilities, a local study involving 12 districts, conducted by study by Pattinson et al. (2015), echoed other studies (Boex et al., 2019; Oleribe, 2019). The study assessed the readiness of 106 CHCs/MOUs, 63 DHs and 13 RHs and 4 tertiary hospitals to provide basic and comprehensive emergency obstetrics care services in 12 districts in South Africa. This study found that none of the MOUs could provide basic emergency obstetric care and only 48% of DHs were able to provide comprehensive

emergency obstetric care which included the ability to perform caesarean sections in addition to the basic functions (Pattinson et al., 2015).

Similar findings were reported in another study that assessed the readiness of healthcare facilities to provide basic and comprehensive emergency obstetric care in one district with high iMMR in Gauteng (Thwala et al., 2018). The study included eight CHCs/MOUs, two DHs, four RHs and a tertiary hospital. All hospitals the hospitals fulfilled the requirements for comprehensive emergency obstetric care services but none out of the eight MOUs was able to provide all the basic emergency obstetric care services. The authors also commented that in line with the United Nations standards, the district needed 17 additional facilities with basic emergency obstetrics care given the size of its population. A study assessing health system constraints for the performance of safe caesarean sections in Gauteng South reported that compared to central hospitals, DHs and RHs were under resourced and therefore underprepared to manage caesarean section-related complications (Maswime and Buchmann;2016). All the studies discussed in this section support the view that one of the major obstacles against the success of the CPF is lack of resources. Lack of resources had a major impact healthcare worker working in CMJAH 's ability to deliver quality maternity healthcare to the patients. Based on the above the overcrowding that was reported in the regional and tertiary hospitals in the cluster is most likely due to lack of adequate facilities in the cluster as well as the perception of poor quality of care in PHC facilities. The jury is however out there that women's perceptions of quality of care influences their utilisation of maternal healthcare services (Creanga et al., 2017). Women bypass facilities on the perceived to be providing poor quality of care.

The lack of resources in the cluster was not limited to infrastructure, equipment, consumables and personnel only but included CTOP services. There was a shortage of CTOP, more especially for second trimester services. This is perhaps another example of the malalignment between policy and practice. Despite the progressive CTOP policy, women continued to experience challenges when seeking TOP services. The reasons for the low numbers of facilities offering TOP in the cluster couldn't be established. However, previous studies attributed this shortage to the lack of infrastructure and

personnel, conscientious objections by healthcare workers and, the lack of political will (Favier et al., 2018; Harries et al., 2011). The lack of access to safe termination of pregnancy services results in women opting for unsafe abortion and consequently, abortion related maternal deaths (Gerdtz et al., 2017; Mokgethi et al., 2016). Illegal abortion is responsible for 14.5% of maternal deaths worldwide and SSA bears the greatest burden (Bhutta and Black, 2013; Faundes and Shah, 2015). In South Africa, unsafe abortions exert additional pressure on the already overburdened healthcare system due to the need for more expensive resources such as ICU and specialist healthcare services (Gebhardt et al., 2015; Langa and Mabenge, 2019). Unsafe abortion is responsible for 23% of maternal deaths due to septic abortion in South Africa (Gebhardt, et al., 2015). Similar pregnancy related sepsis was a significant contributor of maternal deaths due to pregnancy related sepsis during the three-year study period. There is a high likelihood that the maternal deaths that were classified as pregnancy related sepsis could have been due to unsafe abortion given the severe shortage of CTOP services in the cluster. During the review of the minutes of cluster M & M meetings, there was a mention of the high rate of incomplete miscarriages and these were suspected to be due to illegal abortions.

Delays in emergency transport featured prominently in the review of maternal mortality. Delay in transport was also identified among the main health system barriers that contributed to the high number of maternal deaths in the cluster by healthcare workers during the interviews. There were unnecessary delays when transferring patients from one facility to another due to late arrival of emergency transport when called. Except for a few exceptions, the majority of the healthcare facilities in the cluster were within less than 60 minutes travelling time yet delays in inter-facility transport were reported as common. A presentation by the Gauteng Emergency Medical Services (GEMS) to the cluster indicated that the number of ambulances and emergency personnel were inadequate. Perhaps this is illustrated by the case of Miss PP presented in the box below:

The Case of Miss PP.

The patient was a 19-year-old G1P0 at 38 weeks and 4 days. She was referred from SRH to CMJAH for fetal distress which was diagnosed in the latent phase of labor. She had no co-morbidities. She booked at 12 weeks and in total, had seven uneventful antenatal visits. The reason for referral was that SRH was not doing caesarian sections on weekends and public holidays because of shortage of staff. The call to transfer the patient was made at 15H00 however the patient only arrived at around 19H00, a total of four hours from the time the call was made. SRH is less than 15km from CMJAH.

Maternal condition was assessed as satisfactory on arrival at CMJAH. The cervix was 3cm dilated, 1cm long, soft, central, station -1 and caput or no moulding. She had a spontaneous rupture of membrane and a diagnosis of grade 1 meconium-stained amniotic fluid was made. There was no cord prolapse. However, the CTG that was done in labour ward on arrival was assessed as pathological (Figure 7.2.) and a decision to perform a caesarian section was made.

The team commenced intrapartum resuscitation immediately. Unfortunately, the caesarian section was delayed by another hour because there was only one emergency caesarian section theatre afterhours. There was already another patient on the table when Miss PP arrived. An attempt to open another theatre was unsuccessful because of shortage of staff.

When the caesarian section was finally done, a 2.8kg female baby with APGARS of zero was delivered. Neonatal resuscitation was unsuccessful. A diagnosis of fresh stillbirth was made. The patient was counseled, referred to social workers and later laid a legal claim of negligence against the hospital.

The fresh stillbirth was clearly avoidable. There were a number of missed opportunities:

- Shortage of staff at SRH hence the hospital was not able to perform an emergency caesarian section for the patient*
- Delay in transporting patient from SRH to CMJAH (a distance of less than 15km)*
- Shortage of staff for to open a second emergency theatre.*

This is in most likelihood going to result in a medicolegal payout as GDOH will not be able to successfully defend this case. It is a tragic outcome considering that the patient kept her part of the contract by religiously attending antenatal care only to be failed by the healthcare system at the time she needed it the most. During the interviews health workers indicated that delays in ambulances and shortage of resources which results in poor maternal and neonatal outcomes were common occurrences. According to the healthcare workers interviews, the outcomes of the delays were usually asphyxiated neonates, stillbirth and in extreme cases, maternal deaths. Healthcare workers also indicated that most of the intrapartum asphyxia related medico-legal cases were result of delays in inter-facility transport or delays in performing caesarian sections due to lack of resources. According to the cluster morbidity and mortality minutes, a proposal sent to the GDOH to try and remedy the situation did not bear any fruits. The above support previous studies that suggested that shortage of resources is responsible for the poor quality of healthcare services in LMIC (Boex et al., 2019, Kruk et al., 2018; Oleribe, 2019).

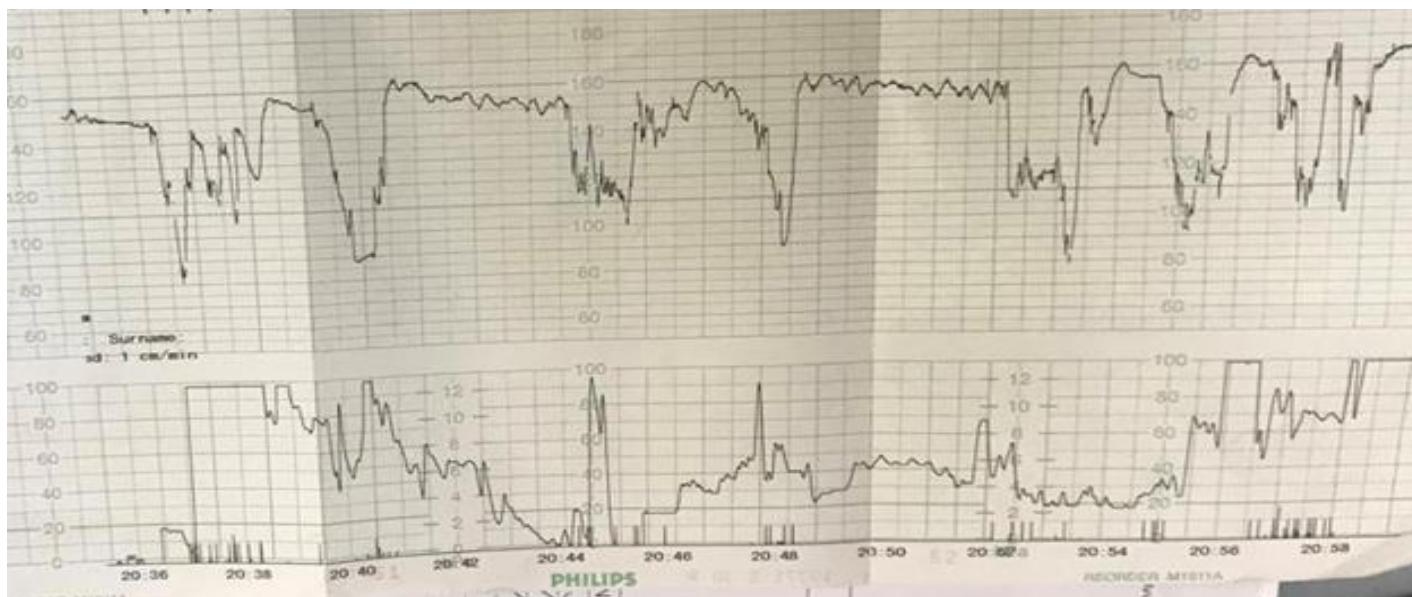


Figure 7. 2: Labour CTG recording of Miss PP

Delays in emergency transport is a recurring theme in all the Saving Mothers Reports and other studies (DOH, 2020; DOH, 2019; Fawcus, 2018; Schoon, 2013). For example,

delay in emergency transport contributed to 9.8% of maternal deaths reported in the 2011-2013 Saving Mothers Report (DOH, 2014). Similarly delays in emergency transport were responsible for 31%, 24%, 19% and 20% of maternal deaths due to OH, hypertensive and anaesthetic-related maternal deaths in the 2014-2016 Saving Mothers report respectively (DOH, 2018; Fawcus, 2018). The same problem was reported in the 2017 and 2017-2019 Saving Mothers Reports (DOH, 2019; DOH, 2021).

A number of factors contribute to the shortage of resources in the public sector. Among those identified are the inadequate production and emigration of healthcare workers, movement of healthcare workers from public to the private sector in search of a better life (economic security, better career opportunities), inadequate investment in health, corruption, poor leadership and management, weak political leadership, fiscal policy choices post 1994, historical socio-political factors (e. g., poverty, lack of education, inequitable distribution of resources) created by the apartheid regime, poor coordination of healthcare services and an ineffective supply chain management (Awases et al., 2004; Commy, 2008; Coovadia et al., 2009; Gerein et al., 2006; Malakoane et al., 2020; Maphumulo and Bhengu, 2019; Mayosi and Benatar, 2014; Mayosi et al., 2012; Rispel, 2016; Rispel et al., 2019). The dismal state of healthcare services in the public sector led for calls to hold healthcare managers and Members of Executive Councils (MECs) personally liable for harm suffered by patients within the public healthcare system (McQuoid-Mason, 2016). While the view is perhaps extreme, it nevertheless suggests that the public is slowly losing patience and want effective solutions to the country's persisted healthcare problems.

Challenges in public healthcare sector South Africa have been widely and continue to be reported to this date, however very little progress has been made over the years (Bateman, 2010; Bleom, 2020; Bloem, 2019; Bresick et.al., 2019; DBSA, 2008; Human Right Watch, 2009; Human Right Watch, 2011; McIntyre and Ataguba, 2014; SAHRC, 2009). These challenges were also identified by the South African Human Rights Commission in 2009 (SAHRC, 2009) however the same problems continue to plague the public health system to date. These challenges need to be address before the

implementation of the UHC and the NHI. Among the key findings from the SHARC report were: poor leadership from provinces, lack of decentralisation of management and budget functions to institutions and districts, dysfunctional DHS, lack of resources, lack of career path for staff, inadequate support and supervision of staff by their managers, victimisation of staff and as results, hostile behaviour by staff towards patients, mistreatment of vulnerable groups such as non-nationals, people with different sexual orientation and children. These and other factors are responsible for the poor quality of care in the public sector as well as the high medicolegal burden that the country (including Gauteng) is facing (South African Law Reform Commission, 2017; Taylor et al., 2018). The SAHRC made a number of recommendations, among those:

- Government must address shortage of human resources and healthcare infrastructure,
- Put together strategies to address overcrowding and staff burnout,
- Root out corruption,
- Decentralise human resource and financial management to CEOs and district managers
- Appoint competent managers in district offices and hospitals and
- Use data to plan and manage healthcare services and healthcare resources.

Implementing new models of care without addressing the elephant in the room (all the issues that were identified by the SAHRC and corroborated in this and other studies) will lead to catastrophic failure of the health system as well as the proposed NHI. Special attention should be paid to RHs and tertiary hospitals. These levels of care carry disproportionate patient load because of the challenges in lower levels of care. Similar to this study, Govender et al. (2018) reported that RHs in Kwazulu-Natal were overcrowded due to shortage of staff and the infrastructure was inadequate in addition to being old. Like the rest of the Country Govender et al (2018) put these challenges squarely on poor leadership. These and other factors are probably behind the less-than-optimal performance of the CPF.

The challenges facing healthcare services in Gauteng are also contained in the recent most recent report that was presented by the Health Portfolio Committee (HPC) to the Gauteng Provincial Legislature in March 2021 (Health Portfolio Committee, Gauteng Provincial Government, 2021). The report outlines GDOH's achievements and challenges during the 2019/2020 financial year. This report is discussed in relation to the study's main findings:

- Programme 1: Administration

GDOH failed to pay service providers within the stipulated 30 days period. This finding has an impact of service provision. Furthermore, department failed to implementation of electronic health records, flouted government's procurement processes and failed to reach its own targets in resolving patients' complaints and improving client satisfaction.

- Programme 2: District Health

The purpose of this programme is to increase the efficiency of PHC services, reduce preventable causes of maternal, infant and child mortality and to promote safe sexual behaviour, especially reducing new HIV infections among young adults and babies. The report also pointed out to the high utilisation of medical and maternity units in the province. This report echoed this study's findings while at the same time pointing out that the high utilisation of maternity services is not confined to a specific area- this problem involves the entire province.

- Programme 3: Emergency medical services

The report identified some improvement and at the same time challenges. In terms of improvement, the report indicated that was an improvement in ambulance response times and noted the purchase of new ambulances. However, there were challenges, among those, attrition of highly skilled staff and outdated EMS infrastructure. Challenges with EMS emerged as a major barrier against the effective implementation of CPF in the cluster.

- Programme 4: Provincial Hospitals

High utilisation of RHs were among the problems identified by the report, again suggesting that RHs across the province were experiencing high patient load

- Programme 5: Tertiary Hospitals

Similarly, the report indicated that there was high usage of tertiary hospital beds in the province and as a result, requested GDOH to establish an effective and functional referral system. The committee envisaged that doing so would ensure that patient is treated at the appropriate level of care. This finding too, consistent with the study's findings.

- Programme 6: Health Sciences training

Collaboration between academic institution and service providers is one of the areas covered by the CPF. Consequentially, the CPF identified academic institutions among the key stakeholders. Health sciences training was not part of the study.

- Programme 7: Healthcare support services

The committee discovered issues with procurement services, problems with medicine supplies, linen and food shortages. The same issues also came out of the interviews with healthcare workers, review of minutes of the minutes of the cluster M and M meetings, and, site visits.

- Programme 8: Health facility management

The committee reported that there were problems with the performance of the Gauteng Department of Infrastructure Development (GDID). GDID is responsible for the planning, building and maintenance of provincial infrastructure. Healthcare facilities also falls under the portfolio of this institution. The lack of infrastructure planning in preparation for the NHI emerged as one of the committee's major concerns. Inadequate and poor or lack of maintenance of healthcare facilities are among the key findings of this study.

- Others

While medicolegal litigations do not constitute a separate programme, the committee noted with concern the high rate of medicolegal litigations, persistence of irregular expenditure and budget underutilisation. The above seems to support healthcare workers' perceptions that the main driver for the poor quality of healthcare in Gauteng is due to poor leadership, ineffective management and, lack of political will and commitment.

7.5.2.4 Summary

From this section the following can be noted in response to the question: "Is the organisation of maternity services in the cluster fit for purpose, contextually appropriate and able to respond to maternity health care needs and challenges?":

- The cluster model is supported by evidence and the CPF from which the model is based is in line with section 27 of the Constitution of the Republic, the White Paper on the Transformation of the Health System and the NHA.
- The cluster model improved clinical governance (standardisation of treatment protocols, improved referral network, created collaboration and support among healthcare workers and between member institutions and created a platform for professional development, collegiality and support).
- CPF suffers from chronic health system problems, mainly the mismatch between demand side of healthcare services.

The mismatch has been brought about by, among others, the lack of resources, poor leadership and management, ineffective coordination of healthcare services, ineffective procurement, lack of political will as well as lack of political commitment. CPF seems to have all the properties of a contextually appropriate healthcare model/policy framework however the CPF is unlikely to succeed until all the challenges that have been discussed in this section are addressed.

7.6. Has the CPF been fully implemented?

This question was answered in the previous section. It is clear from the main findings from the study that the CPF that appear like a great thought through and contextually appropriate healthcare innovation lacked implementation. This is perhaps suggested that the policy framework took three years for it to be signed into policy. There are suggestions that CMJAH is the only cluster that embraced and fully implemented the CPF. Failure of GDOH to implement policies was also confirmed by in the report on the performance of GDOH that was submitted to the 6th Gauteng Provincial Government by the Health Portfolio Committee this year (Health Portfolio Committee, Gauteng Provincial Government, 2021). Poor leadership, lack of implementation of policies, poor planning, weak management, flouting of procurement processes, seem to be among the most common and recurring themes regarding South Africa's public healthcare sector. The implementation of the CPF suffers from the existing public healthcare system challenges. The study found a gap between policy and implementation. This is one of the most significant challenges that confront healthcare systems across the globe (Freedman, 2016).

7.7. Has the CPF been effective in supporting maternity healthcare services and responding to the causes and contributing factors responsible for preventable maternal deaths?

There is increasing recognition of the central role played by the quality of care in reducing preventable deaths globally. A study by Kruk et al (2018) reporting on the role of health system in preventable deaths reported that 60% of the 8 million deaths that occurred in LMICs that they looked at could have been prevented by improving the quality of care. The study went on to report that improving the quality of care could prevent 50% of the maternal deaths in LMICs.

Similarly, Michel et al. (2020) reporting on the perceptions of policy makers, provincial and district healthcare officials, pointed out that the current health system challenges in South Africa is a reflection of the way the health system is designed. This design, the author argue, remains the greatest hindrance against the successful implementation of

the NHI. It is on this basis that South Africa embarked on journey to improve the quality of its health system in 2012 using two strategies: preparation for NHI and PHC re-engineering (Michel et al., 2020). The CPF model in Gauteng was directed at improving the province's healthcare system (GDOH, 2019b). The preceding sections addressed questions around the appropriateness of 'fitness for purpose', health system and implementation barriers as well as the completeness of the implementation of the CPF. The question that is still remaining is whether the CPF has been effective in responding to maternal healthcare needs, causes and factors that contribute to preventable maternal deaths in the cluster.

First is important to note that the CPF is in effect a PHC model that was modified to respond to local conditions. The PHC is a preferred model for healthcare delivery that is backed by the WHO (Reference). The implementation of the CPF in the CMJAH cluster improved clinical governance (accountability, standardisation of treatment protocol, improvement of referral pathways, regular audit and data driven health care planning, among others). Furthermore, the cluster model improved collegiality, created a platform for collaboration and support and also created a continuous service platform by linking the different levels and health districts together.

Their study noted a gradual but sustained decrease in maternal mortality over the three-year study period. While the trend in maternal mortality prior to 2016 were not included, the declined that reported in this study was a significant improvement for the iMMR figures that of over close to 300/100 000 live births in some of the institution. However, the decline in cluster iMMR that has been observed in this study cannot be credited to the implementation of the CPF alone as other this implementation coincided with other interventions such as improvement in ART coverage, implementation of the Safe Caesarean Section Protocol (SCSP), among others. There is however room for one to argue that the CPF played an important role through the strengthening of clinical governance. All other interventions require a strong clinical governance and leadership to succeed. However, the potential of the CPF has been severely limited by chronic health system challenges, among them, poor leadership and management, lack of implementation of policies, ineffective coordination of care and shortage of healthcare

resources. The factors will threaten the successful implementation of the NHI unless addressed.

7.8 Chapter summary

Building on the previous chapter, this chapter integrated the quantitative and qualitative components and used the main study objectives to answer the three research questions. The chapter that the philosophy and design of the CPF makes this model attractive for the Gauteng province as well as context with similar challenges and health needs. CPF as a model offers a promise to strengthen maternity, general health system and support PHC and NHI. However, the potential of this model has been severely restricted by chronic health care challenges. If left unattended these chronic healthcare challenges will likely limit the successful implementation of the much-anticipated NHI.

CHAPTER 8: CONCLUSION, RECOMMENDATIONS, STRENGTHS AND WEAKNESSES OF THE STUDY

8.1 Introduction

It has been suggested that global strategies and evidence-based guidelines are not enough to address country specific healthcare challenges (Freedman, 2016). Countries need healthcare systems that are 'fit for purpose' or simply stated, appropriate to local condition. According to De Jonge and Sandal (2016), healthcare research aims to inform policy and consequently, healthcare planning. Similarly, this study was conducted to inform policy makers and key stakeholders regarding the strengths and weaknesses of the organisation of maternity healthcare services in Gauteng and use the information discovered to recommend healthcare improvement strategies. This chapter presents conclusions that emanated from the study's key findings followed by recommendations. The last section of the chapter addresses the strengths and weakness of the study.

8.2 Overview

Using CMJAH as a case study, the aim of the study was to assess the strengths and weaknesses of the organisation/configuration of maternity healthcare services in Gauteng in order to identify gaps and/or healthcare barriers and to use this information to recommend healthcare services improvement Informed by Stufflebeam's Context, Input, Process and Product (CIPP) model and a convergent mixed method research approach, the following findings are made:

- Maternity healthcare services like the rest of healthcare services in Gauteng are organised in a cluster format as outlined in the CPF (Appendix V).
- The cluster arrangement improved the functioning and coordination of maternity healthcare services through the establishment of clinical governance structures, standardisation of care, strengthening of referral pathways, and, collaboration among healthcare workers and health districts. Furthermore, the cluster created a sense of community by creating a platform where staff could share knowledge and skills, including supporting each other.

- However, the cluster model faced a number of challenges and barriers. These challenges were not confined to maternity healthcare services; they were widespread across the public healthcare system in South Africa.
- The main problem was the mismatch between the demand and supply side of healthcare services.
- A variety of factors contributed to the mismatch. Population growth, cross-border and interprovincial migrations, and non-compliance with referral pathways contributed to an increase in the demand for maternity healthcare services.
- The above was however, not matched by the supply side resulting in the overcrowding of healthcare facilities. There was a severe shortage and an inequitable distribution of resources across the cluster and health districts. Historical political factors, poor planning, weak leadership and management, poor investment in healthcare, weak economic climate and ineffective supply chain management were among the key drivers.
- The mismatch between the demand and supply side resulted in the overcrowding of cluster healthcare facilities.
- Healthcare facilities were not able to manage the high patient numbers due to lack of resources. Consequently, patients had to sit on plastic chairs and benches or slept on floor mattresses while waiting for hospital beds to open.
- The situation was overwhelming for healthcare workers. The high patient volume including shortages of staff and other healthcare resources contributed to the delays in assessing patients, initiating treatment, monitoring patients, timely referrals and adherence to treatment protocols. As a result of all these patients suffered adverse health outcomes and were dissatisfied with the care they received.
- The above conditions created an environment characterised by an increase in patient complaints and medico legal cases, the latter contributing to shortage of healthcare resources.
- Similarly, overcrowding and the lack of resources created a difficult working environment for healthcare workers. Health workers were overburdened, stressed

and unable to cope with the high patient demand. This situation resulted in hostility between patients and staff as well as among themselves.

Adding to the above was the lack of management support and blame culture from senior management. Some of the healthcare workers responded by staying away from work while others resigned to look for employment elsewhere. This situation created a vicious cycle with no end point in sight.

- The cluster arrangement seems to have been providing some buffer however this however, the effect is unlikely to hold for a long time if the existing health system challenges are not addressed. Failure to do so could have devastating effects on the provincial agenda to improve maternity healthcare and reduce maternal mortality, including the successful implementation of the much-anticipated NHI.

A summary of the above is provided in Figure 8.1 below.

8.3 Recommendations

Using WHO health systems building blocks (WHO, 2007) approach the study concludes by making recommendations (Table 8.1). These recommendations are pre-requisite for the successful roll out of the NHI.

Table 8.1 Recommendations

	Short term	Immediate term	Long term
Leadership and governance (Bicagu et al., 2012).	• Perform an audit of all personnel occupying leadership and management position in the province (Head office, districts, healthcare facility) to determine skills mix, capacity and needs.	• Assign job responsibility according to competence level. • Decentralise health care, healthcare workforce management and financial control to districts and hospitals (Fageut,2016; Bossert and Mitchell; 2011) • Ensure appointment of hospital boards, districts and clinics health committees and establish an umbrella body (e.g., School Governing Bodies Association) to ensure	• Strengthen monitoring and performance management • Implement staff development programs • Decentralise health care, healthcare workforce management and financial control to districts and hospitals.

		standardisation of their functions and accountability.	
Healthcare financing.	• Embark on provincial budget reprioritisation and allocation • Create a culture of accountability in the use of resources in healthcare facilities, districts and provincial departments of health.	• Reduce wasteful expenditure and corruption related financial losses through consequences management.	• Use data to budget to inform planning and budgeting for of healthcare services.
Health workforce (Knight et al., 2013; Stones et al., 2019; WHO, 2016a).	• Audit existing healthcare fore • Establish evidence-based staffing norms for maternity services based on the level of care.	• Implement task-sharing and task shifting. This can be achieved through upskilling of existing healthcare workforce. • Create posts for clinical associates at CHCs/MOUs, DHs and RHs to support mother and child services.	• Address chronic staff shortages • Employ sonographers to provide ultrasound services in all the different levels of care. • Train nurses and clinical associates to provide basic obstetric ultrasound services. • Increase the capacity of DCSTs according to existing needs • Establish Emergency Maternal and Neonatal

			Teams to support Obstetrics ambulances and transfer of very sick mothers and neonates.
Infrastructure (Knight et al., 2013; WHO, 2016a).	Audit of existing healthcare facilities to determine needs and capacity Create a database of existing healthcare and other government facilities and evaluate their suitability for renovation or repurposing Audit healthcare facilities in terms of service packages and capacity to deliver the allocated service package Preform and audit of all maternity facilities to determine if the meet the ideal hospital UISS standards.	• Consider investing in alternative building technology (ABT) to address health infrastructure needs. • Increase the capacity of overcrowded healthcare facilities using ABT. • Address shortages of emergency personnel and vehicles.	• Build additional healthcare facilities using data and population dynamics to determine their location and size. This should involve all key stakeholders. • Consider building a dedicated mother and child hospital in Gauteng North and Gauteng South. • The following areas needs new maternity facilities. - City of Ekurhuleni- Tertiary Hospital - West Rand- Regional Hospital possibly at DYDH. - West Rand District: District Hospital. This can be achieved by recommissioning

			Discoverers into a district hospital. - West Rand District: Upgrade Carletonville to a large district or small regional hospital by relocating some of the services to Anglo Gold Ashanti in order to create space. - Diespoot: Large district and preferably a regional hospital to service Diepsloot and Olievenhoutbosch -Coronation- MOU to relive pressure on RMMCH. -City of Johannesburg: District hospital. Hillbrow CHC should be recommissioned to a district hospital.
Information (WHO, 2014)	• Use technology to supplement clinic visits and also to book patients	• Implement health information system and electronic patient records to manage bookings, patient flow and	• Develop and incorporate treatment protocols and machine learning in routine clinical care.

		improve efficiency of healthcare services.	• Incorporate Telemedicine in care pathways (Bataar et al., 2012; Galle et al., 2020).
Medical products, vaccines and technology	• Consider investing in Istats onsite diagnostic machines in facilities without 24hr services which manage high risk pregnancy.	• Ensure 24hr access to laboratory and blood bank services for all healthcare facilities that provide maternity healthcare services.	• Strengthen procurement system and use information technology to monitor and replenish medical stock and equipment.
Service delivery		• Consider establishing service level contract with private healthcare practitioners, clinical and hospital groups in order to address shortage of CTOP services (e.g., GP, Marie Stopes) and relieve pressure on maternity units (e.g., private midwives, multidisciplinary clinical groups	• Public-private collaboration and purchase of services from the private sectors (EMS, doctors, hospital group) • Increase the number Clinic Ward Based Outreach Team (WBOT) to support Community outreach programs (Health education, health promotion, family planning services, promotion of early booking and

		offering comprehensive maternity care such as the Birthing Team). • Establish Onsite Midwife-led Obstetrics Units (OMBU) in busy hospitals (e.g., RHs).	attendance of antenatal care provision of adherence support for ART and other chronic conditions • Address chronic shortage of emergency ambulances and personnel. • Establish a health system intelligence and planning unit (HSIPU) to use data (population and clinical) to assist in monitoring and planning and distribution of healthcare services
Other	Establish policy clarity regarding non-national's access to healthcare services in South Africa so that there is no	• Extend the child support grant to include pregnancy. This can be used to promote clinic attendance.	

	confusion at healthcare facility levels. - Consider applying a policy similar to that of South Africans: migrant women should have free access to HIV and TB treatment as well as maternity and reproductive healthcare services across all levels of care. The above would be in line with the Constitution. - Interpreters should be available at all healthcare facilities providing pregnancy and reproductive healthcare services.	Implement a transport voucher system for pregnant women that can be used to pay for public transport	
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8.4 Strengths and weaknesses of the study

8.4.1 Strengths

- The study combined the strengths of quantitative and qualitative data which corroborated to give deeper understanding of the research problem and at the same time increased the credibility and reliability of the study (Creswell and Plano Clark, 2018).
- Data was sourced from different levels of care and different categories of healthcare worker which helped strengthen the research findings.
- Interview questions were piloted with individuals who did not take part in the study to ensure clarity.
- The principal researcher listened to each digital recording after the interviews and emerging issues or issues which needed more clarity were followed up during subsequent interviews.
- Digital recordings were transcribed by a professional transcriber and research participants were allowed to check the accuracy of the transcripts.
- The principal researcher and the research assist discussed the emerging themes which further strengthened the analysis and final themes.
- Both the principal researcher and research assistant were experienced clinicians working in the field of maternal health. Both have been involved in provincial maternal health structures as assessors and are part of teams commissioned by the GDOH to recommend strategies to improve maternal health in the province at some point.
- The study's findings are consistent with other studies on the challenges that healthcare systems in South Africa and in LMICs face.

8.4.2 Weakness

- Since the purpose of the study was to assess the strengths and weaknesses of the organisation of maternity healthcare services, a comprehensive analysis of maternal deaths was not undertaken. However, reference was made to the Saving Mothers Reports during the literature review and discussion sections.

- The accuracy of data depends on the information provided by the respective healthcare facilities and the quality of the DHIS data used to cross-check the deliveries and maternal deaths data.
- The use of a research assistant had both positive and negative effects on how interviews were conducted in terms of questioning and the results that emerged. What reassures the principal researcher is that the issues expressed in the majority of the interviews were similar regardless of who conducted the interviews.
- The principal researcher coded, interpreted the data and generated themes, all of which are open to subjectivity and personal biases. However, the analysis followed established procedures of thematic analysis and the final result is consistent with literature on healthcare challenges in South Africa making it generalisable.
- The study did not include data on maternal mortality before the implementation of the CPF this is partly because it was difficult to source out accurate data, there are multiple drivers of maternal deaths and seeing a reduction would not necessarily suggest that the success of the CPF. Instead, the focus of the study was to assess the strengths and weaknesses of the organisation of maternity services which the study has managed to achieve.

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APPENDICES

APPENDIX A: UFS HREC ETHICS CLEARANCE

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIBESITHI YA
FREISTATA



UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

Health Sciences Research Ethics Committee

30-Apr-2019

Dear Dr Hlengani Chauke

Ethics Clearance: Fit for the purpose? The strengths and weaknesses of Gauteng Maternity Health care services configuration

Principal Investigator: Dr Hlengani Chauke

Department: Obstetrics and Gynaecology Department (Bloemfontein Campus)

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2018/1347/2805**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Dr. SM Le Grange

Chair : Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee

Office of the Dean: Health Sciences

T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za

IRB 00006240; REC 230408-011; IORG0005187; FWA00012784

Block D, Dean's Division, Room D104 | P.O. Box/Postbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa



APPENDIX B: EKURHULENI HEALTH DISTRICT RESEARCH APPROVAL



EKURHULENI HEALTH DISTRICT RESEARCH PERMISSION

Research Project Title Fit for the purpose? The strengths and weaknesses of Gauteng Maternity Healthcare Services Configuration.

NHRD No: GP_201901_039

Research Project Number: 07/05/2019-01

Name of Researcher(s): Dr Hlengani Lawrence Chauke

Division/Institution/Company: University of Free State

Date of review by the EHDRC: 07 May 2019

DECISION TAKEN BY THE EKURHULENI HEALTH DISTRICT RESEARCH COMMITTEE (EHDRC)

- This document certifies that the above research project has been reviewed by the EHDRC and permission is granted for the researcher(s) to commence with the intended research project.
- Facilities approved for the research: Nokuthela Ngwenya CHC; Phillip Moyo CHC; and Germiston Hospital.
- Participants' rights and confidentiality must be maintained throughout the study period and when disseminating the findings.
- No resources (financial, material and human resources) from the health facilities will be used for the study. Neither the district nor the health facilities will incur any additional cost for the study.
- The study will comply with Publicly Financed Research and Development Act 2008 (Act 51 of 2008) and its related regulations.

-
- The EHDRC must be informed in writing before publication or presentation of research findings and a copy of the report/publications/presentation must be submitted to the EHDRC
 - The district must be acknowledged in all the reports/publications generated from the research.
 - The researcher will be expected to provide the EHDRC with
 - Six monthly progress updates including any adverse events
 - The final study report in electronic format
 - Present the final research findings at the annual Ekurhuleni research conference if possible.
 - The EDHRC reserves the right to withdraw the approval, if any of the conditions mentioned above have being breached
 - The research committee wishes the researcher(s) the best of success.

DR. J. SEPATA
DEPUTY CHAIRPERSON: CITY OF EKURHULENI

Dated: 7/5/2019

Dr. R. Mellema
CHAIRPERSON: GAUTENG DEPARTMENT OF HEALTH (EKURHULENI HEALTH DISTRICT)

Dated: 07/05/2019

APPENDIX C: JOHANNESBURG HEALTH DISTRICT RESEARCH APPROVAL



JOHANNESBURG HEALTH DISTRICT

UFS
Ethics Committee of The Faculty of Health Sciences
University of Free State
lawrence.chauke2@wits.ac.za

Enquiries: Dr EM Ohaju
Tel: 011 694 3888 Cell: 076 8831659
Email: Elizabeth.Ohaju@gauteng.gov.za
Hillbrow CHC: Administration Building
Cr Smith Str. & Klein Street
Private Bag X21, Johannesburg
South Africa, 2017

DRC Ref: 2019-02-003

NHRD Ref no: GP_201901_039

Dear: Dr Hlengana L Chauke

**TITLE: FIT FOR THE PURPOSE? THE STRENGTHS AND WEAKNESSES OF GAUTENG MATERNITY
HEALTHCARE SERVICES CONFIGURATION**

Your application for research approval refers.

The District Research Committee has reviewed your application. This letter serves as an in-principle approval to access the Districts Health facilities (mentioned below) for the above project subject to following conditions:

- The facility to be visited: **DISCOVERERS CHC, SOUTH RAND HOSPITAL**
- This facility will be visited from **14/03/2019 to 14/03/2020**
- The research can only commence after you submit an ethics clearance certificate from a recognized institution.
- You will report to the Facility Manager before initiating the study.

Region	Regional Health Manager	Contact No.	Cell phone
Southrand	Dr N Maleka	011 681 2002	071 872 6649
ABCEF	Ms Matlala	011 440 1259	082 307 0267

The following conditions must be observed:

- Participants' rights and confidentiality will be maintained all the time.
- No resources (Financial, material and human resources) from the above facilities will be used for the study. Neither the District nor the facility will incur any additional cost for this study.
- The study will comply with **Publicly Financed Research and Development Act, 2008 (Act 51 of 2008) and its related Regulations.**
- You will submit a copy (electronic and hard copy) of your final report. In addition, you will submit a six-monthly progress report to the District Research Committee.

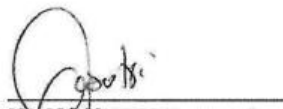
- Your supervisor and University of Free State will ensure that these reports are being submitted timeously to the District Research Committee.
- The District must be acknowledged in all the reports/publications generated from the research and a copy of these reports/publications must be submitted to the District Research Committee.

We reserve our right to withdraw our approval, if you breach any of the conditions mentioned above.

Please feel free to contact us, if you have any further queries. On behalf of the District Research Committee, we would like to thank you for choosing our District to conduct such an important study.

Regards,


 Dr E.M. Ohaju
 Chairperson: District Research Committee
 Johannesburg Health District
 Date 30/04/2019


 Mrs M.J. Morewane
 Chief Director (AcAHS)
 Johannesburg Health District
 Date: 2/05/2019

APPENDIX D: WEST RAND DISTRICT COUNCIL RESEARCH APPROVAL



**WEST RAND DISTRICT
FAMILY MEDICINE**
Dr M. MAGETHI
Telephone: (011) 9516219
Cell: 0614845666
mmagethi@gmail.com

To: Dr Hlengani Lawrence Chauke

Email: chauke@telkomsa.net, lawrence.chauke@wits.co.za

FROM: Dr Moshe Magethi

DATE: 25 April 2019

REF: NRHD GP_201901 _ 042

PROJECT TITLE: Fit for purpose. THE STRENGTH AND WEAKNESSES OF GAUTENG MATERNITY HEALTHCARE SERVICES CONFIGURATION.

Dear Dr Hlengani Lawrence Chauke

We have received your application to conduct research in the West Rand District Council. We are pleased to inform you that your request was assessed and approved. Take note that you will need to forward a copy of the Ethics Clearance Certificate before commencing your research. Please also share your findings and recommendations with the district to assist with future clinical policies.

We wish you well during this project. For any additional information, feel free to contact our department.

Regards,

Dr Moshe Magethi

BsC, MBBCh (Wits); MMed Fam Med (Wits)
DA (SA); H.Dip Fam Med (SA); FCFP (SA)
Specialist Family Physician
Acting Head of Clinical Unit
West Rand District Council
Department of Family Medicine
University of Witwatersrand

APPENDIX E: CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL RESEARCH APPROVAL



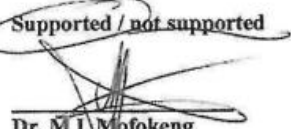
Enquiries:
Ms. N. Mzila
Office of the Clinical Director
Email: Nolwazi.Mzila@gauteng.gov.za
Tell: (011) 488-4812
21 November 2018

Dear Dr H. L. Chauke

STUDY TITLE: Fit For Purpose? The Strengths and Weaknesses of Gauteng Maternity Health Care Services Organisation

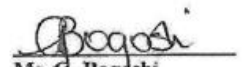
Permission to conduct the above mentioned study is provisional approved. Your study can only commence once Ethics approval is obtained. Please forward a copy of your Ethics Clearance Certificate as soon as the study is approved by the Ethics Committee for the CEO's office to give you the final approval to conduct the study.

Supported / not supported


Dr. M.L. Mofokeng
Clinical Director

DATE: 26/11/2018

Approved / not approved


Ms. G. Bogoshi
Chief Executive Officer

DATE: 27.11.2018

APPENDIX F: RAHIMA MOOSA MOTHER AND CHILD HOSPITAL RESEARCH APPROVAL



RAHIMA MOOSA MOTHER AND CHILD HOSPITAL
Tel: (011) 470 9031/9269
Fax: (011) 477 4117
Email : Frew.Benson@gauteng.gov.za

27 March 2019

Professor Laurence Chauke
Charlotte Maxeke Johannesburg
Academic Hospital

Dear Professor Chauke

Re: Permission granted for the proposed study entitled "FIT FOR THE PURPOSE? THE STRENGTHS AND WEAKNESSES OF GAUTENG MATERNITY HEALTHCARE SERVICES CONFIGURATION"

Permission is granted for you to conduct the research as indicated in your request as per the title above.

The terms under which this permission is granted is contained in the Researcher Declaration form that you signed. Failure to comply with these conditions will result in the withdrawal of such permission.

Note that it is imperative that you notify the hospital of the actual start and end dates of your study by notifying the research coordinator for the hospital, Mrs Karen Marshall on Karen.Marshall@wits.ac.za

Should the study commence more than 12 months from receipt of this letter then the Researcher Declaration form needs to be re-signed prior to commencement of the research. You are strongly advised to keep a signed copy of the declaration form so as to ensure that the terms of this agreement are complied with at all times.

Yours sincerely,

Executive Clinical Manager
Dr Frew Benson

ADDRESS: cnr. FUEL & OUDSTHOORN STREET CORONATIONVILLE 2093 / PRIVATE BAG X20 NEWCLARE 2112 JHB

APPENDIX G: TAMBO MEMORIAL HOSPITAL RESEARCH APPROVAL



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

OFFICE OF THE CEO

Dr. A. Naidoo
Tambo Memorial Hospital
☎ : (011) 898-8317
☎ : (011) 892-0358
✉ : AvisN@gpg.gov.za

MEMO

To : Dr H L Chauke
From : Dr A Naidoo
Chief Executive Officer
Date : 17 October 2018
Subject : Request to Carry Out Research at Tambo Memorial Hospital: GP

This serves to grant permission Dr H L Chauke to carry out a research study: *Fit for the purpose? The strengths and weaknesses of Gauteng Maternity Healthcare Services Organisation* at Tambo Memorial Hospital. This permission is granted in light of improving the skill capacity of the Gauteng Department of Health.

The permission is granted in line with the code of ethics or research.

The information of the Gauteng Health Department will be used for the purpose of research and it will be utilized discreetly and confidentiality will be maintained at all times.

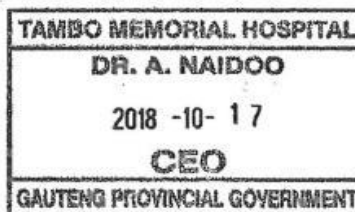
The permission is granted in good faith with the notion and understanding that the abovementioned clause is upheld.

Furthermore, there should be no financial implication to the hospital.

The collection of data will be the responsibility of the researcher.

Yours Sincerely,

Dr A Naidoo
Chief Executive Officer



APPENDIX H: LERATONG HOSPITAL RESEARCH APPROVAL



Leratong Hospital
Private Bag X2078
Krugersdorp
1740

Enquiries: Mr G J Dube
Tel: (011) 411-3531
Fax: (011) 410-8421
Email: GreyD@gpg.gov.za
Ref: 9/3/3/1

ATTENTION: Dr H L Chauke

SUBJECT: REQUEST TO CONDUCT RESEARCH: THE STRENGTHS AND WEAKNESSES OF GAUTENG MATERNITY HEALTHCARE SERVICES ORGANISATION

Permission has been granted to conduct research study entitled: The strengths and weaknesses of Gauteng Maternity Healthcare Services at Leratong Provincial Hospital based on the conditions indicated from Policy Planning and Research Department. For further arrangements contact Dr. R.M. Phanzu on 011 411-3508 for further arrangements.

It would be appreciated if you could share your result of the research with the Management of Leratong Hospital.

Thank you for showing interest in our institution.

Kind regards


CHIEF EXECUTIVE OFFICER
/jve
2019/04/30

APPENDIX I: EDENVALE REGIONAL HOSPITAL RESEARCH APPROVAL



EDENVALE REGIONAL HOSPITAL

Department of Obstetrics/Gynaecology
Modderfontein Road
Private bag x 1005 , Edenvale, 1610
Tel: 011 321 6112

e-mail makgobane.ramogale-zungu@gauteng.gov.za

ENQUIRIES : DR RAMOGALE-ZUNGU

DATE : 22 Oct 2018

Dear Dr Chauke

Re: Request to conduct research titled:

The strength and weaknesses of Gauteng maternity healthcare services organisation

Permission to conduct the above mentioned study is granted. Please forward a copy of Ethics Clearance Certificate as soon as the study is approved by Ethics Committee for the CEO's office.

Supported / Not Supported

Dr Ramogale-Zungu
Head of Obstetrics and Gynaecology
Specialist Obstetrician and gynaecologist
Edenvale hospital

Approved / Not Approved

Dr Claude Mondzanga
Acting CEO
Edenvale hospital

APPENDIX J: SOUTH RAND HOSPITAL RESEARCH APPROVAL



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

SOUTH RAND HOSPITAL

1 Friars Hill Road, Rosettenville, 2149

ENQUIRIES:

Office of the CEO

T: 011 681 2004

M: 071 872 6649

E: Nobantu.Maleka@gauteng.gov.za

To: Dr Chauke

**RE: FIT FOR THE PURPOSE? THE STRENGTHS AND WEAKNESSES OF
GAUTENG MATERNITY HEALTHCARE SERVICES ORGANISATION**

The above noted study has been noted and approved. The research may be undertaken at South Rand Hospital. South Rand Hospital pledges to provide the required support in terms of access as well as guidance should it be required.

Regards,

Dr M. N. Maleka
CEO, South Rand Hospital
Date: 25 April 2019

South Rand Hospital
Friars Hill Rd

APPENDIX K: CARLETONVILLE HOSPITAL RESEARCH APPROVAL



WEST RAND DISTRICT
FAMILY MEDICINE
Dr M. MAGETHI
Telephone: (011) 9516219
Cell: 0614845666
mmagethi@gmail.com

To: Dr Hlengani Lawrence Chauke

Email: chaukehl@telkomsa.net , lawrence.chauke2@wits.co.za

FROM: Dr Mpangula

DATE: 11 March 2019

REF: GP-201901-042

PROJECT TITLE: Fit for purpose. THE STRENGTH AND WEAKNESSES OF GAUTENG MATERNITY HEALTHCARE SERVICES CONFIGURATION.

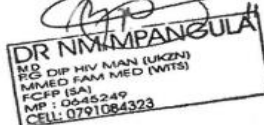
Dear Dr Hlengani Lawrence Chauke

We have received your application to conduct research in Carletonville Hospital in the West Rand District Council. We are pleased to inform you that your request was assessed and approved unconditionally. Take note that you will need to share your findings and recommendations with the district to assist with future clinical policies.

We wish you well during this project. For any additional information, feel free to contact our department.

Regards.

Dr NM Mpangula


11/04/2019

DR NM MPANGULA
MD DIP HIV MAN (UKZN)
RMED FAM MED (WITS)
FCFP (SA)
MP : 0045249
CELL: 0791084323



ENQUIRIES
Office of the Acting CEO
Dr D P Moloi
Tel: 018 788 1701
E-mail: diekeiseng.moloi@gauteng.gov.za

MEMO

TO : PROF L CHAUKE
OFFICE OF THE CHIEF EXECUTIVE OFFICER
CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

FROM : DR D P MOLOI

DATE : 11/04/2019

RE : PERMISSION TO CONDUCT STUDY

Please be informed that Carletonville Hospital hereby approves request to Conduct a study on strengths and weaknesses of Gauteng Maternity Healthcare organization.

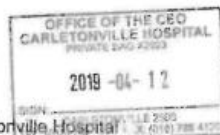
Hope you will find this in order.

Kind Regards

Dr D P Moloi

Acting CEO Carletonville Hospital

Date: 11/04/2019



CARLETONVILLE HOSPITAL
Anson Road, Carletonville 2495
T 018 788 1701

APPENDIX L: BERTHA GXOWA HOSPITAL RESEARCH APPROVAL



ENQUIRIES
Office of the CEO
M | 079 264 8411
T | 010 344 2997
E | Jatin.Ganda@ @gauteng.gov.za

14th of November 2018

To: Dr. Chauke

From: Dr JC Ganda, ACEO Bertha Gxowa Hospital.

Re: Fit for the purpose? The strengths and weaknesses of Gauteng Maternity Healthcare Services organisation

The above noted protocol has been reviewed and approved. The research may be under taken at Bertha Gxowa Hospital.

Bertha Gxowa Hospital pledges to provide the required support in terms of access as well as guidance should it be required.

Yours Sincerely.

Dr JC Ganda
ACEO Bertha Gxowa Hospital.

BERTHA GXOWA HOSPITAL
Angus Street, Germiston. 1401.
T | 011 089 8569

APPENDIX M: TRANSCRIBER CONFIDENTIALITY AGREEMENT

UNIVERSITY OF THE FREE STATE

CONFIDENTIALITY AGREEMENT

Transcription Services

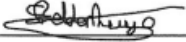
FIT FOR PURPOSE? THE STRENGTHS AND WEAKNESS OF THE
ORGANISATION OF GAUTENG MATERNITY HEALTHCARE SERVICES

I, Samantha Geldenhuys, transcriptionist, agree to maintain full confidentiality in regards to any and all audiotapes and documentation received from Lawrence Chauke related to his doctoral study on 'Fit for purpose? The strengths and weakness of the organization of Gauteng Maternity Healthcare services. Furthermore, I agree:

1. To hold in strictest confidence the identification of any individual that may be inadvertently revealed during the transcription of audio-taped interviews, or in any associated documents;
2. To not make copies of any audiotapes or computerized files of the transcribed interview texts, unless specifically requested to do so by Lawrence Chauke;
3. To store all study-related audiotapes and materials in a safe, secure location as long as they are in my possession;
4. To return all audiotapes and study-related documents to Lawrence Chauke in a complete and timely manner.
5. To delete all electronic files containing study-related documents from my computer hard drive and any backup devices.

I am aware that I can be held legally liable for any breach of this confidentiality agreement, and for any harm incurred by individuals if I disclose identifiable information contained in the audiotapes and/or files to which I will have access.

Transcriber's name (printed) Samantha Geldenhuys

Transcriber's signature 

Date 14.04.2020

APPENDIX N: UFS DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

LETTER OF RECOMMENDATION



16 October 2018

Post Graduate Research Committee : PhD
Obstetrics and Gynaecology
University of the Free State
Bloemfontein

**Letter of Recommendation for PhD Programme for candidate Hlengani Lawrence Chauke
:FIT FOR THE PURPOSE? THE STRENGTHS AND WEAKNESSES OF GAUTENG
MATERNITY HEALTHCARE SERVICES ORGANISATION**

It is my pleasure to recommend Hlengani Lawrence Chauke for admission to PhD (Obstetrics and Gynaecology) at the Free State University. I came to know Dr Chauke since July 2007 during my Obstetrics and Gynaecology residency training at the Steve Biko and Kalafong Academic complex, University of Pretoria who was my mentor and later colleague. I later joined Dr Chauke as a consultant Obstetrician and Gynaecologist at the University of Pretoria in July 2011-October 2014. It was a great pleasure and honour to have worked with Dr Chauke.

Overall, Dr Chauke is highly intelligent and has good analytical skills. Dr. Lawrence Chauke has developed a strong record in research since joining the department of O&G. His research focus centers in adverse perinatal outcome. This made him a suitable partner in an international collaborative research on classification of stillbirths and local research involvement in effects of HIV on perinatal outcome. Currently involved with investigating medical education in South Africa especially through the Colleges of Medicine of South Africa as an exit examiner. Dr. Chauke's curriculum vitae lists 8 peer-reviewed papers and 6 articles. He is first author for 10 and a major contributor in the remaining publications. He has first-authored 6 peer-reviewed abstracts all of which were presented at national meetings. He has also written 3 book chapters in major books for O&G.

Laurence has excellent communication skills. His written work is both clear and concise, as well as interesting to read. Lawrence is also extremely dedicated to the concept of education and uplifting individual for greater achievement. He feels a strong sense of responsibility to the students in his classes and he takes their success very personally. He established website for mentoring FCOG Part I & II candidates which attracted more than 50 candidates from all the medical universities in South Africa. He has mentored more than 30 graduates in Mmed (O&G)

and FetoMaternal subspeciality fellows altogether. His CV reflect more than 6 candidates supervised for Mmed(O&G) projects. One of the unique skills I admired from Dr Lawrence Chauke is the ability communicating with registrar, administration and patients.

1

Dr. Lawrence Chauke has been invited to present papers at many conferences both locally and at international level. He is recognized by the training registrars and fellows as being an exceptional clinician who matches cutting edge critical care skills with a broad perspective of avoiding futile care and bringing the necessary support for patients even going an extra mile. Dr. Lawrence Chauke is one of the academics who is always invited to present papers or chair sessions in most of our high impact conferences like SASOG, O&G update.

He is well respected in the society as a person who strive to educate even the ordinary men on the street. This is well attested by more than 20 talk shows he participated at the community gatherings, churches and radio or TV broadcast on health related matters. Dr Lawrence Chauke is one of the few dedicated South Africans that I have met over 8 years or so. Dr. Lawrence Chauke holds membership to local and international O&G societies.

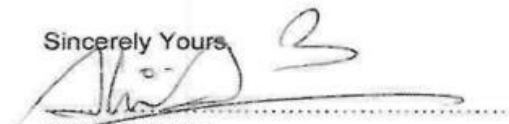
Dr. Lawrence Chauke is a valuable member of the family of obstetrics and gynaecology as he very highly skilled. His overall strength is his dedication to reduce perinatal morbidity and providing quality education for both nursing and medical staff.

At a personal level, Lawrence is a well-disciplined, industrious academic with a pleasant personality who always went well beyond the course requirements in the quantity and quality of his projects putting in a lot of extra research and attending office hours every week. Throughout the interaction I had with Laurence, he demonstrated great perseverance and initiative.

Laurence is unquestionably an exceptional candidate for postgraduate PhD programme in Obstetrics and Gynaecology. Laurence has proven herself to have the perseverance, initiative, and intellectual creativity necessary to complete an advanced postgraduate degree. I would therefore highly recommend Dr Lawrence Chauke. His track record and past achievements indicate of how he would be an extremely positive asset to the PhD program in Obstetrics and Gynaecology.

If I can be of any further assistance, or provide you with any further information, please do not hesitate to contact me at 0823386600 or email me at shisana.baloyi@gmail.com or BaloyiSM@ufs.ac.za

Sincerely Yours,



Shisana Baloyi
Professor and Academic Head of O&G

APPENDIX O: WITS DEPARTMENT OF FAMILY MEDICINE RESEARCH APPROVAL

DEPARTMENT OF FAMILY MEDICINE
UNIVERSITY OF THE WITWATERSRAND



23 October 2018

To whom it may concern:

Re: *Fit for the purpose? The strengths and weaknesses of Gauteng maternity healthcare services organisation*

I am writing in support of Dr Hlengani Lawrence Chauke's research project above.

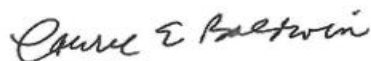
Dr Chauke, the Head of Clinical Unit in Obstetrics and Gynaecology at the CMJAH and a joint academic appointee with Wits University, has enrolled at the University of the Free State to pursue his PhD studies.

The topic Dr Chauke has chosen to investigate, that of the robustness of the health system in the CMJAH cluster in providing maternity care to expectant mothers and new-borns, is critical to addressing the challenges facing Gauteng Health in reaching the Sustainable Development Goals with regards to maternal mortality.

Using a multi-method research approach, Dr Chauke is proposing a desktop review of essential policy documents, a clinical audit of all health facilities in the cluster providing intra-partum care and interviews with key informants. His research will provide new knowledge that will benefit all pregnant women in our province as well as improve the functioning of the public health care system in preparation for National Health Insurance.

Therefore, I would be grateful for any assistance to Dr Chauke as he seeks both Human Research Ethics Committee approval, as well as facility permission, to conduct this important study.

With thanks and kind regards

A handwritten signature in cursive script, reading 'Laurel Baldwin'.

Laurel Baldwin-Ragaven AB, MDCM, FCFP (SA), FCFP (Canada)
Professor of Family Medicine
Head: Clinical Department of Family Medicine (Gauteng Department of Health)

Faculty of Health Sciences, 29 Princess of Wales Terrace, PVT Building, 4th Floor
Parktown, 2193, Johannesburg, South Africa
☎ +27-(0)11-717.2041, 📠 +27-(0)11-717.2558

APPENDIX P: PARTICIPANT INFORMATION LEAFLET

DATE: 22/08/2018

Study title: FIT FOR THE PURPOSE? THE STRENGTH AND WEAKNESSES OF GAUTENG MATERNITY HEALTH CARE SERVICES ORGANISATION.
Lead investigator: H L Chauke Ethics Reference Number:

You are invited to take part in a study on the strengths and weaknesses of a Gauteng Health Cluster Policy Framework as a strategy to achieve reduction in maternal mortality and improve maternal health outcomes. Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect the care you receive. If you do want to take part now, but change your mind later, you can pull out of the study at any time.

This Participant Information Sheet will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. We will go through this information with you and answer any questions you may have. You do not have to decide today whether or not you will participate in this study. Before you decide you may want to talk about the study with other people, such as family, friends, or healthcare providers. Feel free to do this.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

This document is 4 pages long, including the Consent Form. Please make sure you have read and understood all the pages.

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of the study is to investigate the strengths and weaknesses of the organization of the Gauteng Health Maternity Services so as to identify health system barriers and recommend health system improvement.

WHAT WILL MY PARTICIPATION IN THE STUDY INVOLVE?

You will be asked to participate in the interview which will be digitally recorded. Furthermore, you will be asked to complete a questionnaire. Both the interview and the questionnaire will ask you questions around your work and your health institution, including work related challenges. This information will assist the researchers in assessing whether the Gauteng Health Maternity Services organization is capable of achieving of reducing maternal deaths and if not what the obstacles are and how the situation can be improved. You have been selected because of your work position or involvement in the care of pregnant women in Gauteng.

WHAT ARE THE POSSIBLE BENEFITS AND RISKS OF THIS STUDY?

There are no foreseeable risks to you or personal benefits. We however think that the knowledge that will come from this study might assist in improving maternity services and reducing maternal deaths in Gauteng and other similar settings.

WHO PAYS FOR THE STUDY?

There is no cost to you. All the cost of the study will be the responsibility of the principal investigator.

WHAT ARE MY RIGHTS?

Your participation is voluntary. You are therefore free to decline to participate or withdraw from the study at any time without any consequence. Your confidentiality will always be protected, and no personal identifying information will be used in the analysis or reporting of data. The interview recording will be password secured and destroyed immediately after transcription.

WHO DO I CONTACT FOR MORE INFORMATION OR IF I HAVE CONCERNS?

If you have any questions, concerns or complaints about the study at any stage, you can contact:

Name, position: Lawrence Chauke, Principal Investigator

Telephone Number: 0832775201

Email: chaukehl@telkomsa.net

You can contact the Health Research Ethics Committee that approved this study on:

Name: Mrs Mare Marais (Head Ethics administration)

Telephone Number: 27 51 401 7795

Email: EthicsFHS@ufs.ac.za

APPENDIX Q: CONSENT FORM FOR INTERVIEWS/QUESTIONNAIRE

Thank you for reading the information sheet about the interviews. If you are happy to participate then please complete and sign the form below. Please initial the boxes below to confirm that you agree with each statement:

	<i>Please Initial box:</i>
I confirm that I have read and understood the information sheet dated [22/08/2018] and have had the opportunity to ask questions.	☐
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any question or questions, I am free to decline.	☐
I understand that my responses will be kept strictly confidential. I understand that my name will not be linked with the research materials and will not be identified or identifiable in the report or reports that result from the research.	☐
I agree for this interview to be tape-recorded. I understand that the audio recording made of this interview will be used only for analysis and that extracts from the interview, from which I would not be personally identified, may be used in any conference presentation, report or journal article developed as a result of the research. I understand that no other use will be made of the recording without my written permission, and that no one outside the research and transcribing team will be allowed access to the original recording.	☐
I agree that my anonymised data will be kept for future research purposes such as publications related to this study after the completion of the study.	☐
I agree to take part in this interview.	☐

Name of participant

Date

Signature

Principal Researcher

Date

Signature

To be counter-signed and dated electronically for telephone interviews or in the presence of the participant for face-to-face interviews

Copies: *Once this has been signed by all parties the participant should receive a copy of the signed and dated participant consent form, and the information sheet. A copy of the signed and dated consent form should be placed in the main project file which must be kept in a secure location.*

APPENDIX R: HEALTH FACILITY AUDIT

HEALTH FACILITY AUDIT

Name of Institution:

Level of care:

District:

Person completing the questionnaire:

Contact number:

SECTION A: INFRASTRUCTURE AND BEDS

VARIABLE	ANSWER
Total number of Antenatal beds	
Total number of labour ward beds	
Total number of post-natal beds	
Total number of labour ward high care beds	
Is your caesarean section theatre located in the labour ward?	YES / NO (Please circle)

SECTION B: STAFFING

Kindly indicate the total number of the different categories of health worker in your unit/department

STAFF CATEGORY	TOTAL NUMBER
Nursing	
Advanced Midwives	
Professional nurses with midwifery	

Professional nurses without midwifery	
Enrolled nurses	
Enrolled nurses' assistants	
Nursing Community Service	
Medical	
Medical Officers/ registrars	
Specialists	
Support staff/Auxiliary	
Phlebotomists	
Ward attendants	
Clerks	
Porters	
Cleaners	

Are you able to cover all the key services areas with the number of staff you provided above? Please use the space below to explain and also to suggest possible solution.

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APPENDIX S: INTERVIEW GUIDE

INTERVIEW GUIDE

FIT FOR THE PURPOSE? THE STRENGTHS AND WEAKNESSES OF GAUTENG MATERNITY HEALTHCARE SERVICES

A. OVERVIEW

Interviews will have conducted with frontline health workers (Nurses, doctors) and their immediate supervisors/ managers to assess the strengths and weaknesses of the organisation/configuration of maternity services. The interviews will explore the following areas:

- Day to day experiences of healthcare workers in terms of how maternity services are organised and provided
- Healthcare and health system barriers, challenges and enablers
- Perceived causes and contributing factors for the barriers and challenges
- Impact of challenges and barriers on the health system is ability to provide safe and quality maternity healthcare services
- Impact of healthcare worker's experiences on the ability to provide safe and quality healthcare for the patients
- Impact of healthcare workers' experiences on their personal and social well being
- Possible solutions

B. PART 1: ADMINISTRATIVE

- Introduce yourself and thank the participant for agreeing to take part in the study.
- Discuss the purpose and procedures involved in the study and the interview

- Obtain written consent for the interview and also for recording the conversation
- Make them feel at ease and allow them to talk freely
- Use tactics such as rephrasing their statements back to them and follow up questions to gain clarity of the issues raised or to explore some of the issues
- Write down short reflective memos to capture some interesting thoughts, emerging issues and issues that need follow-up
- Allow time for questions at the end of the interview

C. PART II: ICE BREAKER

- Icebreaker: Ask the participant to tell you about themselves, their position, their job and what they like most about their job.
- If still unsettled proceed to ask the participant, why they chose this specific field.

D. PART III: EXPLORING THE STRENGTHS AND WEAKNESS OF THE ORGANISATION OF MATERNITY HEALTHCARE SERVICES

- What do you think about the organisation and quality of maternity healthcare services in Gauteng?
- Why do you think so?
- Tell me about the day-to-day challenges and barriers that you experience as a health worker providing maternity services in your area of work/institution
- How widespread are these barriers and challenges?
- What do you think are possible causes for these barriers and challenges?
- How do the barriers and challenges affect patient care?
- How do the barriers and challenges affect you and other healthcare providers?
- What do you do in response to these challenges?
- What about your colleagues and health workers in general?
- Given your experiences and observations, what do you see as possible solutions?
- Anything else you would like to add?

E. PART IV: CONCLUSION

- Thank the study participant for their time and give them another opportunity to ask questions.
- Inform them that a summary of the results will be shared with them, participating institutions, districts, the cluster and Gauteng Department of Health. Furthermore, the study will be published in one of the medical journals.

APPENDIX T: SITE VISIT GUIDE

SITE VISIT GUIDE

The site visit should focus on obtaining the following information:

- Observe and record general state of the place in terms of layout and hygiene
- How is the layout in terms of patient flow? Does the unit have a maternity admission area, separate first stage, labour, antenatal, postnatal and high care wards?
- Is obstetric theatre located in the maternity section?
- Any benches, chairs and floor mattresses in any of the areas?
- Wards lay out and general conditions of the place
- Observe for overcrowding
- Observe and ask healthcare workers about basic resources: laboratory access, blood bank, drugs, medical products and consumables in general, etc.

Interact with healthcare workers and ask questions to obtain information or seek clarity regarding some of the observations

APPENDIX U: ASSESSMENT GUIDE: MINUTES OF THE CLUSTER MORBIDITY AND MORTALITY MEETINGS

ASSESSMENT GUIDE: MINUTES OF THE CLUSTER MORBIDITY AND MORTALITY MEETINGS
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In the minutes look for the following:

- Issues raised regarding the functioning of maternity services and causes of maternal deaths and contributing factors?
- Any proposals and interventions to address some of the challenges
- Were they implemented and if so any evidence that they worked?
- Do the minutes provide any possible reasons for non-implementation or implementation failure?
- General concerns and challenges regarding maternity services in the region/province

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APPENDIX V: GAUTENG CLUSTER POLICY FRAMEWORK (CPF)



**GAUTENG DEPARTMENT OF HEALTH
CLUSTER POLICY FRAMEWORK DRAFT**

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FOREWARD

ABBREVIATIONS

CHBAH	Chris Hani Baragwanath Hospital
CHWs	Community Health Care Workers
CMJAH	Charlotte Maxeke Johannesburg Academic Hospital
DHS	District Health System
DGMAH	Dr George Mukhari Academic Hospital
DCST's	District Clinical Specialist Teams
EMS	Emergency Medical Services
GDOH	Gauteng Department of Health
GP	General Practitioner
IMR	Infant Mortality Rate
PHC	Primary Health Care
SBAH	Steve Biko Academic Hospital
WHO	World Health Organisation

DEFINITION OF TERMS

Definition of a CLUSTER

A collection of health facilities from different levels of healthcare provision (primary, secondary and tertiary) which are grouped together in a designated demographic area. Clusters are functional structures organised around a Central Hospital. They are not statutory body or governing structure and they are also not permanent features of the landscapes, they have originated out of a need for different levels of care in the same geographical area to better collaborate to provide the care demanded by the population. This is not a consolidation of management capacity, but rather a collegial effort to treat patients at the appropriate level of care and better manage resources in general.

Definition of a HEALTH CARE SYSTEM

A health system consists of all the organizations, institutions, resources and people whose primary purpose is to improve health.^{1,2} This includes efforts to influence determinants of health as well as more direct health-improvement activities. The health system delivers preventive, promotive, curative and rehabilitative interventions through a combination of public health actions and the pyramid of health care facilities that deliver personal health care (by both State and non-State actors).³ The actions of the health system should be responsive and financially fair, while treating people respectably.^{1,2,3} A health system needs staff, funds, information, supplies, transport, communications and overall guidance and direction to function. ^{1,2,3}

Definition of the LEVELS OF CARE

Primary Health Care (PHC): Accessible first level health services included as part of the package of basic essential health services *based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their*

development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process.⁴

Secondary Health Care: Secondary health care refers to a second tier of health system, in which patients from PHC are referred to specialists in higher level hospitals for treatment. In South Africa, the health centers for secondary health care include District hospitals and Regional hospitals.

Tertiary Health Care: Specialized consultative health care, usually for inpatients and on referral from a primary or secondary level of health care, in a facility that has personnel and facilities for advanced medical investigation and treatment, such as a tertiary referral hospital.

Definition of HEALTH FACILITIES

Clinic: A facility at and from which a range of PHC services is provided and that is open eight or more hours a day based on the need of the community to be served.

Community Health Centre: A facility that provides PHC services, 24 hour maternity, accident and emergency services and beds where health care users can be observed for a maximum of 48 hours and which normally has a procedure room but not an operating theatre.

District Hospital (level one hospital): A hospital which receives referrals from and provides generalist support to clinics and community health centres with health treatment administered by general health care practitioners or primary health care nurses.

Provincial Tertiary Hospital (level three hospital): A hospital which receives health care users from and provides sub-specialist support to a regional hospital and requires the expertise of clinicians working as sub-specialists.

Regional Hospital (level two hospital): A hospital which receives referrals from and provides specialist support to a district hospital and where health care users require the expertise of teams led by resident specialists.

Specialised hospital (level four hospital): A hospital which provides care for specified groups of health care users.

Tertiary Institution: Any institution providing health education at a tertiary level within the Province.

Definition of the World Health Organisation (WHO) HEALTH SYSTEMS FRAMEWORK

The World Health Organisation (WHO) framework describes the health systems in terms of six core components or building blocks, namely: service delivery, health workforce, health information systems, access to essential medicines, financing, and leadership/governance (Figure 1).³

The WHO Health System Framework

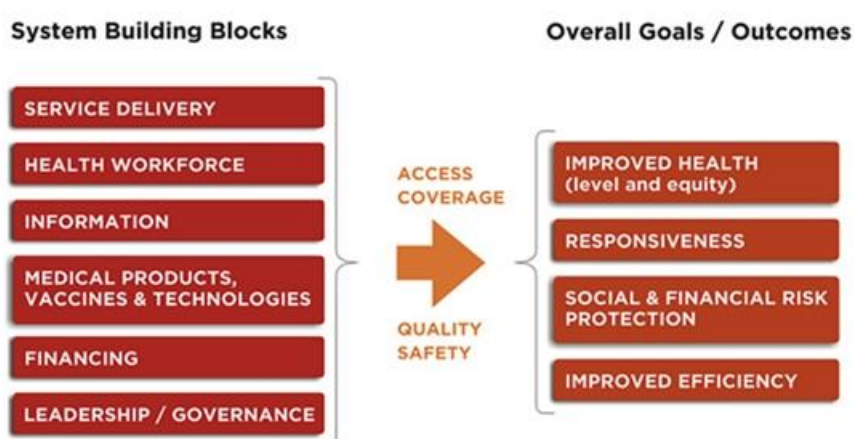


Figure 1: The WHO Health System Framework

The six building blocks contribute to the strengthening of health systems in different ways. Some cross-cutting components, such as leadership/governance and health

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information systems, provide the basis for the overall policy and regulation of all the other health system blocks. Key input components to the health system include specifically, financing and the health workforce. A third group, namely medical products and technologies and service delivery, reflects the immediate outputs of the health system, i.e. the availability and distribution of care.

TABLES**Table 1:** Total population distribution of Gauteng Province 288**Table 2:** Gini coefficient by district in Gauteng Province 289**Table 3:** Health status of Gauteng Province 289**Table 4:** Beds per Cluster as of June 2016 291**Table 5:** Health facilities in the CMJAH Cluster 293**Table 6:** Health facilities in the CHBAH Cluster 295**Table 7:** Health facilities in the SBAH Cluster 298**Table 8:** SBAH Cluster hospitals and CHCs 299**FIGURES****Figure 1:** The WHO Health System Framework 281**Figure 2:** Hierarchy of health service delivery in South Africa 284**Figure 3:** Gauteng Province layout into five Sub-districts 287**Figure 4:** Gauteng Department of Health Referral Network Channel 291**Figure 5:** CMJAH cluster coverage 292**Figure 6:** CHBAH geographical coverage 294**Figure 7:** Map of the cluster catchment area within the CHBAH Cluster 294**Figure 8:** Map of the SBAH Cluster catchment area (Tshwane and Ekurhuleni)
296**Figure 9:** SBAH referral routes 297**Figure 10:** Gauteng Department of Health referral pathways 305

SECTION A: CLUSER POLICY FOR GAUTENG

1. INTRODUCTION

The primary purpose of the Gauteng Department of Health (GDOH) is to improve the health of the people of Gauteng through the provision of quality health care. The Department believes that managing health facilities in a geographical cluster format will assist in its goal to effectively provide health services within the limits of available resources.

Currently, no legislative provisions are available that propose the management of health facilities in a province in a cluster format, however section three in the National Health Act (2003) states that: ‘The National Department of Health, every Provincial Department of Health and every Municipality must establish such health services as are required in terms of this Act, and all health establishments and health care providers in the public sector must equitably provide health services within the limits of available resources.’⁵

The South African Healthcare System is organised in a hierarchical fashion (Figure 2) in order to address the Constitutional right of the population, namely: ‘to provide access to health care to all’. In order to achieve this mandate, the efficiency principle of consolidating scarce resources and decentralising non-scarce resources is used.

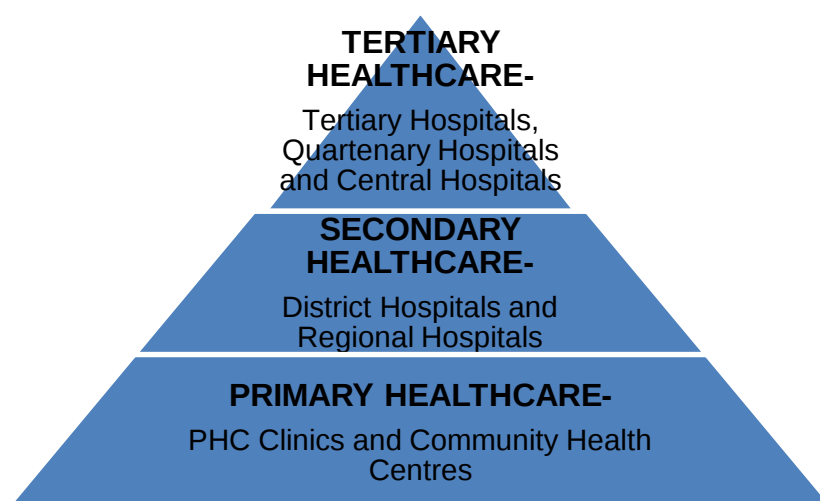


Figure 2: Hierarchy of health service delivery in South Africa

GDOH recognises that in order for Cluster management to be useful, it must achieve the following:

Improve efficiency and management of scarce resources through ensuring that patients are seen at the appropriate level of care.

Health care workers must take responsibility of the healthcare system as a whole and not just for the work received in their specific facility.

Create opportunities to build capacity and healthcare worker skills at the peripheral areas of the health service delivery platform in order to create depth at different levels.

Thus, the aim of this document is to provide a policy which will standardise operations for: clinical care and governance as well as human resource management within a Cluster delivery model.

2. VISION

The vision of the GDOH is: *'To be the best provider of quality health services to the people in Gauteng'.*

Section 27 of The Constitution states that: 'Everyone has the right to have access to health care services, including reproductive health and every child has the right to basic nutrition, shelter, basic health care services and social services.' While the right of access to health care services is limited by the resources available to the State, there is nevertheless an obligation on the GDOH to provide the best possible care within the available resource envelope.⁶

3. CONSTITUTIONAL AND LEGISLATIVE FRAMEWORK

There are no constitutional and legislative documents that outline the role of Cluster however, there are several documents that guide the vision of the GDOH to deliver quality health services, namely:

3.1 Constitutional mandate

The Constitution of the Republic of South Africa (Act No. 108 of 1996) is the supreme law of the country and 'the obligations imposed by it must be fulfilled'.⁶ The Constitution applies to natural and juristic persons, as well as all law. It binds the legislature, the executive, the judiciary and all organs of state. The right to health care services is provided for in three sections of the South African Constitution. These provide for access to health care services including reproductive health and emergency services; basic health care for children, and medical services for detained persons and prisoners.

Universal access is provided for in section 27(1)(a) which states that: 'Everyone has the right to have access to health care services, including reproductive health care...' Section 27(1)(b) provides for the State to: 'take reasonable legislative and other measures, within its available resources to achieve the progressive realisation of the right.' According to the Limburg Principles, progressive realisation does not imply that the state can defer indefinitely, efforts for the full realisation of the right. On the contrary, state parties are to 'move as expeditiously as possible towards the full realisation of the right' and are required to take immediate steps to provide minimum core entitlements. Section 27(3) states that no one can be denied emergency medical treatment. Section 28(1)(c) provides for "basic health care services" for children, while section 35(2)(e) provides for "adequate medical treatment" for detainees and prisoners at the State's expense.⁶

3.2 Policy mandates

This Policy also takes the spirit of various policies that are part of the State's efforts to provide and ensure access to healthcare in South Africa and makes them detailed and applicable to Gauteng. Thus, this Policy effectively gives these policies more specifics to address with regard to cluster. The GDOH Cluster Framework Policy flows, inter alia, from the following documents:

White Paper: National Health Insurance for South Africa (2015)⁷

Gauteng Department of Health Cluster Management guidelines (2015)⁸

Gauteng Department of Health referral system (2014)⁹

4. SITUATIONAL ANALYSIS

4.1 Gauteng Province's demographic profile

Gauteng province is a densely populated urban area with 13.2 million people living in an area of 18 179 km² and a population density of 680 / km², compared to the South African average of 42 per km². The Province is divided into five Sub-districts, namely: Ekurhuleni Metropolitan, Johannesburg Metropolitan, Sedibeng District, Tshwane Metropolitan and the West Rand (Figure 3).

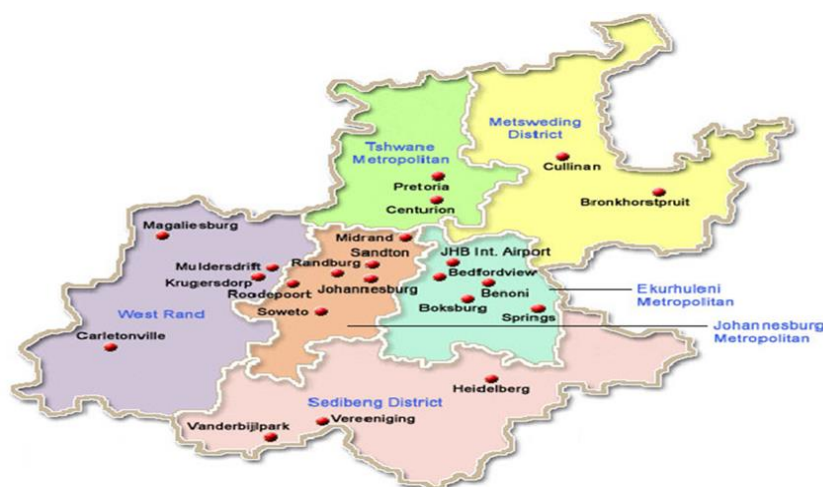


Figure 3: Gauteng Province layout into five Sub-districts

According to the 2015 mid-year population estimate the Gauteng population has grown to 13.2 million and contributes to 24% of the country's population (Table 1), with 19.7% (3.28 million) younger than 15 years and 26,3% (1,16 million) 60 years and over. All South African official languages are spoken in Gauteng with 1% of the Gauteng population speaking non official languages.

Table 1: Total population distribution of Gauteng Province

District	Total population	No. of males	No. of females
City of Johannesburg	4 949 347	2 478 191	2 471 156
Ekurhuleni	3 379 104	1 736 750	1 642 354
West Rand	838 594	434 601	403 993
Mogale city	383 864	195 238	188 626
Randfontein	156 985	79 300	77 685
Westonaria	108 902	58 913	49 989
Merafong city	188 843	101 150	87 693
Sedibeng	957 528	478 307	479 222
Emfuleni	733 445	361 692	371 752
Midvaal	111 612	57 926	53 685
Lesedi	112 472	58 688	53 784
Tshwane			

Source: Statistics SA, community survey 2016

Gauteng's average monthly household care expenditure is R5 661 – although this average masks major inequality Gauteng has an expenditure derived Gini co-efficient of 0.7(Census 2011) compared to a South Africa value of 0.65. Table 2 below illustrates the Gini Co-efficient by district.

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Table 2: Gini coefficient by district in Gauteng Province

District	Gini co-efficient
Sedibeng	0.64
City of Johannesburg	0.66
Ekurhuleni	0.65
West Rand	0.63
Tshwane	

Source: Socio-Economic Review, 2016

The health status of the people of Gauteng is summarized in the Table 3 below:

Table 3: Health status of Gauteng Province

	City of Joburg	Ekurhuleni	Sedibeng	West Rand	Tshwane
Inpatient Crude death rate (percentage)	5.4	5.6	5.7	6.1	
Maternal mortality rate (per 100 000 live births)	90.4	169.3	122.3	128.6	
Neonatal death rate (per 1000 live births)	9.2	10.2	9.1	5.4	
Tuberculosis					
Diagnosed cases- 2014 (per 100 000 population)	363.3	316.7	476.4	439.9	
Death rate- 2013 (percentage)	5.4	5.3	9.3	8.7	
MDR cases- 2014/2015 (percentage)	5.7	6.0	4.8	6.5	
MDR cases- 2014/2015 (percentage)	83.1	86.3	77.5	80.6	

**TB successful
treatment rate
(percentage)**

HIV/AIDS

HIV testing coverage 18.8 20.6 30.5 25.1

% (including

antenatal care) 71.9 75.1 83.9 91.1

TB/HIV co-infection

cases on ART

(Percentage) 86.9 85.4 90.0 98.3

Antenatal client

initiated on ART 0.90 1.32 1.84 1.77

Infant positive PCR

at 6 weeks

(percentage)

Source: District Health Barometer 2015

4.2 Health service delivery platform in the Gauteng Province

Four central hospitals are the core of the GDOH health service delivery model (Table 4), namely:

Charlotte Maxeke Academic Hospital (CMJAH),

Chris Hani Baragwanath Academic Hospital (CHBAH),

Dr George Mukhari Academic Hospital (DGMAH) and

Steve Biko Academic Hospital (SBAH)

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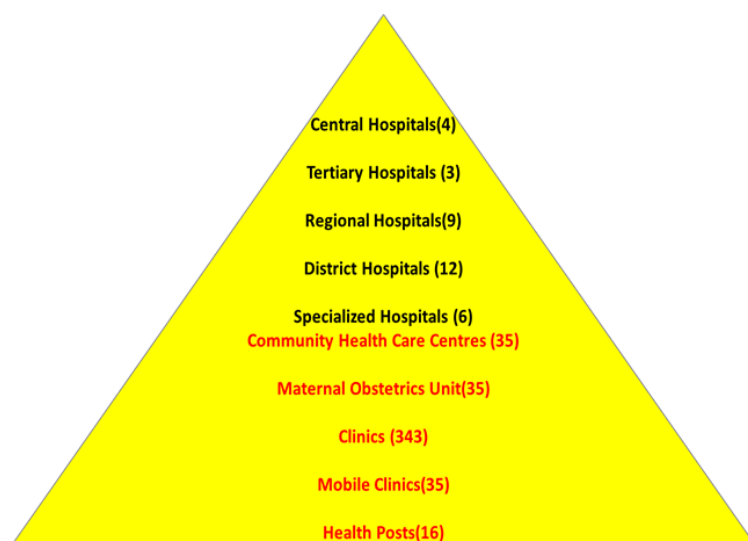
Table 4: Beds per Cluster as of June 2016

GDOH clusters	Central hospitals	Tertiary Hospitals	Regional Hospitals	District Hospitals	Specialised Hospitals	Total beds per cluster
CMJAH	1066	616	1956	268	1086	4992
CHBAH	2888	N/A	2440	1546	N/A	6874
DGMAH	1550	N/A	N/A	838	N/A	2388
SBAH	832	1692	322	357	888	4091
Total						18345

These central hospitals form a referral network that cascades from PHC level to secondary then tertiary and central health care level. Figure 4 below illustrates the number of health facilities within each tier of health service delivery. The rationale for using the four central institutions is:

Good Continuum or package of care and easy access, nearer home

Rationalized and graded medical care, per cluster but can cross refer and transfer

**Figure 4: Gauteng Department of Health Referral Network Channel**

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4.2.1 Charlotte Maxeke Academic Hospital (CMJAH) cluster profile

Geographical coverage of the CMJAH Cluster:

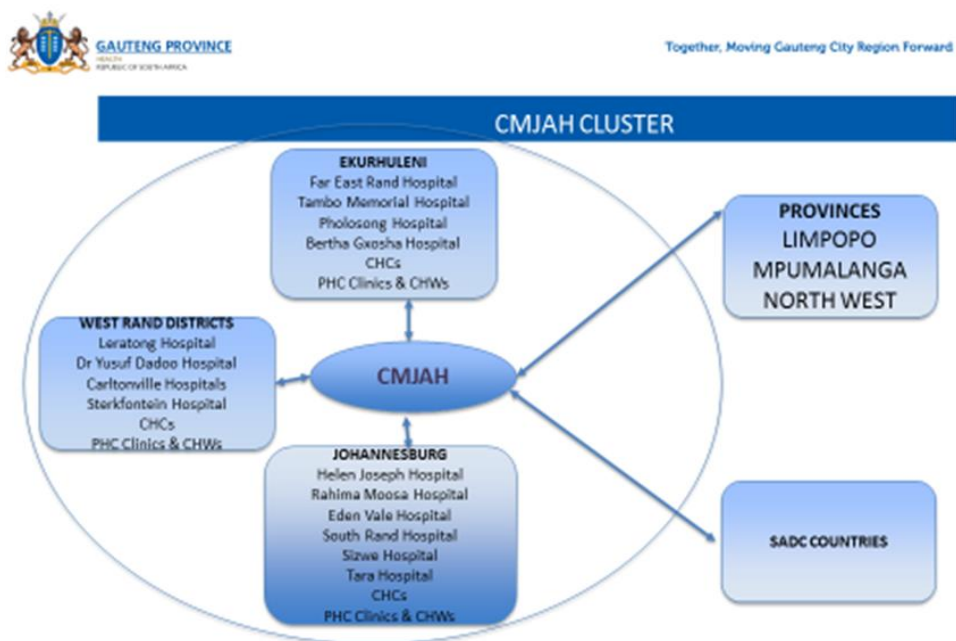


Figure 5: CMJAH cluster coverage

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Health facilities in the CMJAH Cluster:

Table 5: Health facilities in the CMJAH Cluster

Hospital name	Hospital level	Number of beds	Hospital km radius to central hospital	Clinic/ community health centre name km radius to central hospital	Number of district clinical specialist teams supporting the cluster
CMJAH	3		0km		
BERTHA	1	300	32.0km	14 clinics	2 DCST
QXOWA				2 CHC's	
CARLTONVILLE	1	230	120km		1 DCST
SOUTH RAND	1	314	13.0km	1 CHC	1 DCST
EDENVALE	2	230	11.0km	1 CHC	0 DCST
FAR EAST RAND	2	387	50.0km	4 CHC's	1 DCST
TAMBO MEMORIAL	2	258	32.0km		
RAHIMA MOOSA	2	338	11km		
PHOLOSONG	2	483	52km	1 CHC	1 DCST
SIZWE	4	266	20km		
STERKFRONTEIN	4	673	40km		
TARA	4	141	11.1km	1 clinic	

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4.2.2 Chris Hani Baragwanath Academic Hospital (CHBAH) cluster profile

Geographical area of the CHBAH Cluster:

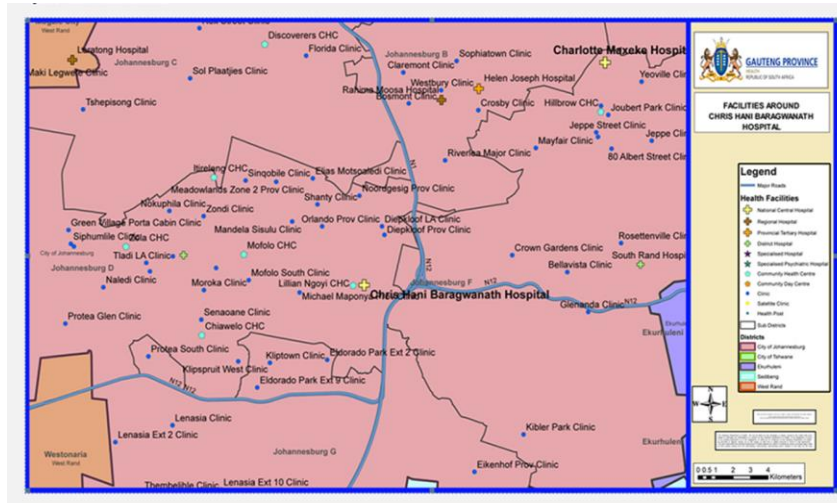


Figure 6: CHBAH geographical coverage

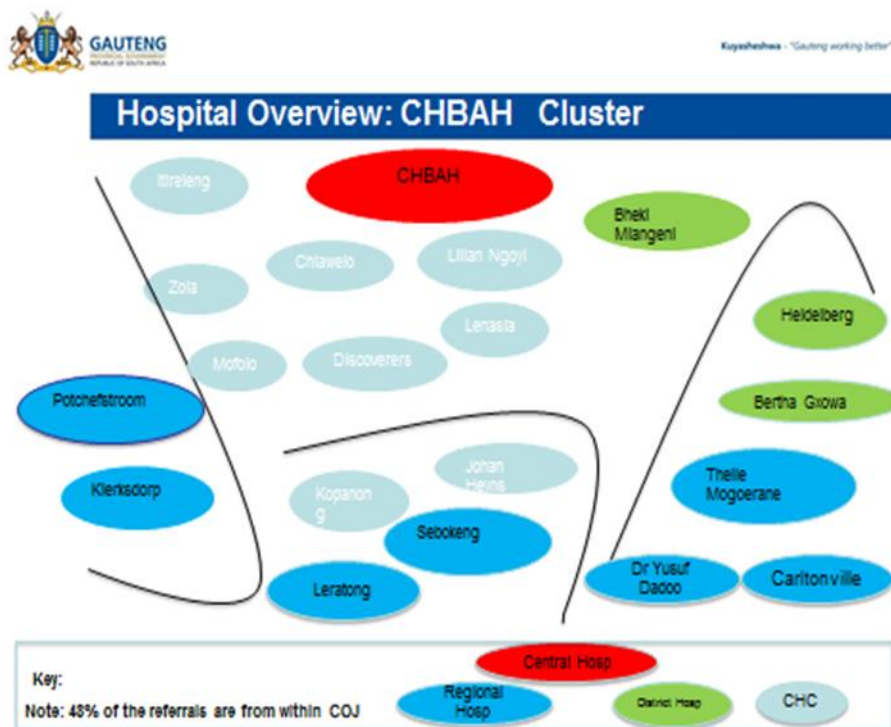


Figure 7: Map of the cluster catchment area within the CHBAH Cluster

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Health facilities in the CHBAH Cluster (Table 6):

Table 6: Health facilities in the CHBAH Cluster

Hospital name	Hospital level	Number of beds	Hospital km radius to central hospital	Clinic/ community health centre name km radius to central hospital	Number of district clinical specialist team supporting the cluster
CHBAH	3	2639	0km		
BERTHA	1	300	27.8km	14 clinics	
QXOWA				2 CHC's	
BHEKI	1		10.3km	8CHC's	
MLANGENI					
KOPANONG	1	248	15.0km		
SOUTH RAND	1	314			
LERATONG	2	855	34.7km		
SEBOKENG	2	800	63.9km		
THELLE	2	821	38.4km	3 CHC's	
MOGOERANE					

Dr George Mukhari Academic Hospital (DGMAH) cluster profile

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4.2.3 Steve Biko Academic Hospital (SBAH) cluster profile

Geographical area of the SBAH Cluster:

The SBAH Cluster consists of 5 sub-districts in Tshwane District and 1 sub-district in Ekurhuleni District, namely (Figure 8):

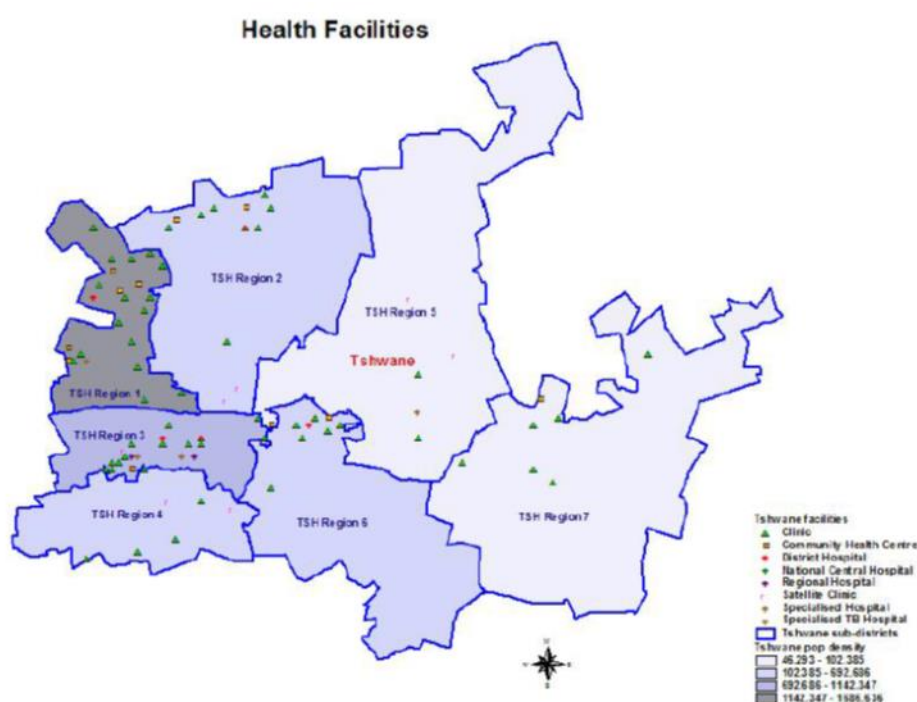


Figure 8: Map of the SBAH Cluster catchment area (Tshwane and Ekurhuleni)

Tshwane District: SBAH is situated in the Tshwane District. It is situated within this area and serves the populations of the 5 sub-districts (2, 3, 4, 5 and 6) with a number of overlapping and sharing of service provision with Dr George Mukhari Academic Hospital (DGMAH) serving other two sub-districts (1 and 7) in this area.

EKURHULENI DISTRICT: Tembisa Hospital is situated within this area serves the populations of the North sub-district of the Ekurhuleni District. Tembisa hospital is the only hospital in this Sub-district and it refers to SBAH for central hospital care.

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OTHER PROVINCES: The population from neighbouring provinces (Limpopo and Mpumalanga) also refers to SBAH and thus constituting the population that the hospital services at provincial level albeit referrals from other provinces is significant as has a direct impact on public service demands/needs and what SBAH can afford (Figure 9) .

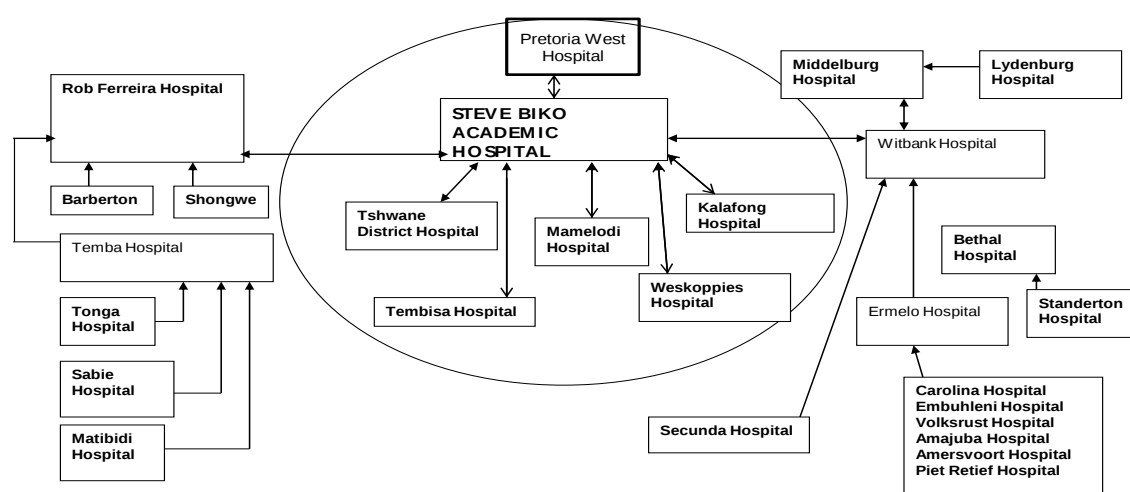


Figure 9: SBAH referral routes

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Health facilities in the SBAH Cluster (Table 7 and Table 8):

Table 7: Health facilities in the SBAH Cluster

Name of Sub-districts	CHC	Clinics	District Hospitals	Regional Hospitals	Tertiary Hospitals	Central Hospitals	Specialized
Tshwane							
Sub-district 2	1	12	1 Jubilee	0	1 Kalafong	0	
Sub-district 3	1	12	2 Pretoria West Tshwane	0	0	1 Steve Biko Academic	Tshwane Rehabilitation Westkoppies Psychiatric
Sub-district 4	0	5	0	0	0	0	
Sub-district 5	0	6	0	0	0	0	
Sub-district 6	2	9	0	1 Mamelodi	0	0	
Tshwane Total	4	44	2	1	1	1	2
Ekurhuleni							
North 1	1	11	0	0	Tembisa	0	0
North 2	1	14	0	0	0	0	0
Ekurhuleni total	2	25	0	0	1	0	0

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Table 8: SBAH Custer hospitals and CHCs

Sub-district	Health facility	Level	No of beds (official)	No of beds (active)	No of PHC attached	Distance to SBAH (km)
Tshwane						
2	Kalafong	tertiary	857		-	14
2	Jubilee	district	551		-	41,5
2	Temba CHC	CHC	-		12	50.9
3	SBAH	central	843	814	-	-
3	Pretoria West	district	178		-	8.3
3	Tshwane District	district	200		-	1.0
3	Tshwane Rehabilitation	Specialized	79			2.8
	Westkoppies Hospital	specialized	1067			8.6
3	Laudium CHC	CHC	-	-	12	16.8
4	-	-	-	-	5	
5	-	-	-	-	6	
6	Mamelodi	regional	400		-	19.0
6	Eersterus CHC	CHC	-		9	12.3
Ekurhuleni						
North 1	Tembisa	tertiary	840			35.3
North 1	Esangweni CHC	CHC	-		23	46.2
North 2	Ethafeni CHC	CHC	-			44.9

5. CLUSTER MANAGEMENT PRINCIPLES

The following guiding principles of the cluster system are based, on the legislative requirements above and promote evidence based decision making, within the given environment that would bring about the most impact:

5.1 Aim to see patients at the lowest appropriate level of care

One of the reasons for the cluster management approach is to strengthen the district health services, with regards to availability of resources and skills.

A strengthened district health system will enable patients to be treated appropriately, prevent complications and unnecessary referrals to higher levels of care.

5.2 Standardization of clinical care

The cluster approach will create a working environment which will ensure a uniform, standardized service for all patients regardless of point of entry.

Clinical protocols and guidelines to be developed by the teaching hospital/ university to be uniformly utilized from the clinic level to specialized hospital across the given cluster.

5.3 Maintain academic interaction

The cluster approach allows easy access to an extended training platform for undergraduate and post graduate students and allows academic inputs into the cluster as a whole.

It will create an opportunity to train health professionals that will remain within peripheral facilities.

5.4 Improved clinical care and clinical outcomes

The process of improving the way the cluster as a whole addresses the burden of disease will be improved if a 'learning system' exists where, over time, the attitudes, skills and clinical competencies of health personnel at all levels increase. This can be achieved through clinical audits, clinical outreaches, discussions, case reviews, clinical feedback to referring health care workers and the availability of learning material to address and improve morbidity and mortality outcomes within the cluster.

5.5 Apply a systems approach

The entire health service has to be seen and managed using an integrated health system approach. Services must be delivered as efficiently as possible.

Effective cluster management will look at what is best for the health system as a whole including cross border considerations, cross-cluster teamwork, and constant knowledge share to improve the health system.

In order for the cluster to adopt a systems approach effectively, the cluster as a whole needs to work as a team.

5.6 Clinical Governance

Effective cluster management expects that all Clinical Heads of Department at various levels of clinical departments that refer patients to the Central hospital are accountable to the Head of the Cluster.

The Clinical Head of Department of the Central hospital should think beyond the hospital boundaries and identify risks both within the Central hospital and the cluster.

The support to the entire cluster will form part of the Clinical Heads of Departments' Performance Contracts.

5.7 Data use for decision making

Cluster data needs to be collated, analysed and disseminated periodically as part of decision making for the cluster.

Cluster research outcomes need to be integrated into patient outcome improvement.

All interventions and new initiatives must be monitored and evaluated to assess whether outputs and outcomes are achieved and targets reached for the cluster.

5.8 Human resources

The health care workers within a Cluster are employed to deliver health services to the Cluster as a whole. The need may arise for any cadre of health care worker to be transferred temporarily or permanently within the Cluster to relieve skill shortage and/or staff shortage as highlighted in the Public Services Act.

5.9 Stakeholders

All stakeholders should effectively ensure that patients are seen at lowest appropriate level of care and that in order for facilities to add necessary value in the long term to the health system, they should function as they are classified. This is something that can also be developed in a cluster setup.

The key stakeholders for cluster management include:

Central hospitals

Other specialized, tertiary, regional and district hospitals in the specific cluster

Emergency Medical Services (EMS)

District Health services

Universities and Nursing Colleges

Hospital Services Directorate at Head Office

Hospital boards and Clinic committees

5.10 Communication strategy

6. REFERRAL NETWORKS

The Gauteng health care delivery network functions through a host of interdependent health care units, at different levels of concentration or resolution capacity, which depend on all other units for the harmonious performance of the system as a whole. Gauteng also renders care in support of other provinces that do not have the necessary capacity for complex clinical care. In order for patients to move between levels of care, a functioning referral system is required. It is also important to ensure that an effective management of patient self-referral within a Cluster exists. All patients examined at any level of care, in a public or private institution, who are deemed in need of more or less specialised consultation, or require care that cannot be provided at the said level will be referred to the appropriate level of care or institution capable of continuing or providing the level of care the patient is in need of. The referral should follow, as much as possible, the hierarchical level of services as depicted in Figure 2.

Key guidelines in the health system that assist in referral management include: Clinical protocols, Standard Operating Procedures, Standard Treatment Guidelines, Essential Medicines List and the Essential Equipment List. These documents provide policy directives and practical management instructions for clinicians who refer patients. They are designed to provide evidence based and rational health services.

Effective referral management will also act as a gauge to better understand the health burden of a geographical area, and indicate any opportunities for up-skilling of staff and resource need, such as equipment, consumables, etc.

There are distinct organisational sub-systems of referral challenges between the levels of health care and there are corresponding referrals that need to be taken into consideration and implemented quite differently, and yet as a complete set, in order for the entire referral system to function optimally. The three basic subsystems are:

Household and community to PHC (clinic and health centre)

PHC (clinic or private surgery and health centre) to district hospital

Between all levels of hospital

The Community Health Workers (CHWs) in the ward based PHC outreach teams and the staff of the school health services must be able to refer patients that they detect needing care to the PHC facilities during their work in the community. From the PHC facilities the nursing staff (and medical officers in some health centres) need to be able to refer patients to hospital and also back to their homes, or to school, for on-going care in the community. Hospitals staff (mostly but not exclusively the doctors) need to be able to refer patients between their various positions of clinical expertise and also back to the PHC facilities or home for ongoing care in the community. Of course no system is this simple and the continuum of care occasionally gets complicated. Some of these complexities can be represented graphically as in Figure 10.

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GAUTENG DEPARTMENT OF HEALTH – HEALTH REFERRAL SYSTEM POLICY

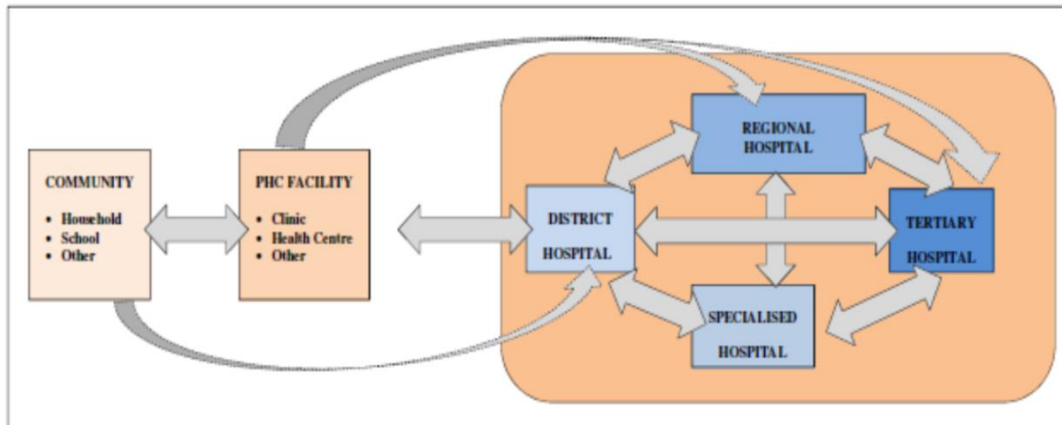


Figure 10: Gauteng Department of Health referral pathways

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SECTION B: CLUSTER MANAGEMENT FRAMEWORK

BUILDING BLOCK	RESPONSIBLE PERSON	ROLE AND RESPONSIBILITY
Leadership and governance	Provincial Office Managers	Head office representation is crucial to ensure enforcement, standardisation across the clusters and to ensure alignment to national and provincial initiatives and planning. These representatives would usually be the hospital services managers, but may change as the head of department deems necessary. In order for cluster management to be effective and achieve what it is designed to achieve it needs to be supported and enforced from top management level.
	Hospital Services Directorate	The Hospital Services Directorate should offer technical and administrative support to the office of the CEO in co-ordinating Cluster activities and meetings.
	Central hospital CEO	The office of the CEO should administer the Cluster committee's interaction The CEO is the Chairperson of the Cluster Committee. They should play a leadership role in the cluster and should enforce the importance of these meetings regularly. Deputy CEOs

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		of the Central Hospitals should also be present in order to allow the CEO to delegate certain cluster responsibilities to this person. The CEO should attend cluster meetings as far as possible, but on the odd occasion that he/she cannot attend the, most senior possible person underneath the CEO can be delegated to attend. Central Hospital CEOs should establish a referral committee to develop and maintain referral systems. These committees should feed summarised information to the cluster committee.
	Universities and nursing colleges	Universities have access to a knowledge platform that can inform best practice in the management of health services in the cluster. The cluster also allows the university a broader training platform (than before), where doctors and nurses can be trained already understanding how the cluster works.
Health workforce		Health care workers will be contracted to work for the cluster as a whole to ensure adequate service delivery for the cluster as well as skills transfer within the cluster
Service Delivery	Central Hospital Heads of Specialist Departments	Relevant Heads of Specialist Departments should take responsibility to appoint appropriate persons to outreach action and any other empowerment that may be required, including standardisation of protocols within the Cluster.

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	Central hospital CEO's	CEOs of central hospital should promote and empower staff to participate in Outreaches. They should ensure that the necessary resources are available to do so.
	District, regional, tertiary and specialist hospital CEOs	CEO's of these hospitals should allow specialist access to their facilities and support them in their empowerment actions. Ideally any outreaches and support should occur from the more specialised facility to the one below it, but practically it should be those facilities that refer into these more specialised facilities. Regional hospitals should as far as possible support district hospitals and tertiary hospitals should support regionals.
Resources	Central Hospital Heads of Specialist Departments	Heads of Specialist Departments should be sure to keep track of resources within the cluster with regards to empowerment actions in order for receiving facilities to effectively plan for and procure necessary medicines and consumables to sustainably continue with actions without having Central Hospitals provide everything.
	District, regional, tertiary and specialist hospital CEOs	CEOs of these hospitals should be sure to effectively budget for sustainable empowerment actions

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Health information	Central hospital CEOs	Central hospital CEOs should ensure there are mechanisms available to monitor and evaluate the cluster as a whole. Tools that may be used for this include the MPAT and OHSC Performance frameworks.
	Central Hospital Heads of Specialist Departments	Heads of Specialist Departments should assist in monitoring cluster M&M statistics as well as inappropriate referral statistics to flag where peripheral empowerment may be required.
	District Health Services	District health services should ensure effectiveness and report on the following services if there are challenges: • Municipal health services • Home/household • Community • Social partnerships • Community Health Workers (CHW) • School health services • Environmental health • Health promotion • Clinics and Community Health Centres (CHCs) • Private practitioners, private/NGO clinics, workplace clinics

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Emergency Medical Services (EMS)

With that said, these services should have access to more specialised services for knowledge share and mentorship

EMS plays an important role in referral management and in general these representatives should understand the movement of acute patients into different facilities. It is important that the manager for the cluster or relevant districts form part of cluster management structures in order to flag challenges with regards to the movement of patients between facilities and between the community and facilities. This should be done by using monitoring and evaluation methods in These representatives may also be able to report on any inappropriate delivery of health care as they move between different facilities in the cluster and have an idea of how each functions. The cluster forum is also a good place to correct any inappropriate transport and routing of patients by these services and a place where protocols can be agreed on.

**Medical products,
vaccines and
technologies**

Central Hospital Heads of Specialist
Departments

Manage the changes to the related Essential Medicines Lists (EML), Essential Equipment Lists (EEL) and ensure that all departments in the cluster have communication of this and means to handle these changes.

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