

MEASURING PERFORMANCE AMONG COMMUNITY MIDWIVES IN LOW-RESOURCE SETTINGS: A MIXED-METHODS STUDY IN SUDAN

Ayat Abu-Agla

Supervised by:
Frédérique Vallières

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Declaration

June 29, 2020

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Ayat Abu-Agla

June 29, 2020

Executive Summary

Sudan faces remarkable health workforce challenges including shortages and skewed geographical distribution. The complexity of the health workforce landscape, the country's volatile geopolitical climate, and an unfavorable health labor market marked by weak absorption capacity and poor retention policies, led to significant migration of the country's health workforce involving nearly 60% of the physician workforce. Sudan's response to the health workforce crisis included the introduction of a primary health care (PHC) expansion programme in 2013, which had amongst its priorities to increase human resources for reproductive, maternal, and child health and improve the performance of Sudan's health workforce. To achieve this, the Sudan Federal Ministry of Health (FMoH) trained and deployed three new frontline health workers: the community midwife (CMW), the community health worker (CHW), and the medical assistant.

Despite the performance of the health workforce being prioritised and noted as important by the Sudan's National Health Sector Strategy, the literature on how to optimise health provider performance within Sudan remains scarce. To date, no performance measure has been established at the Federal or State levels of the health sector. Performance measurement is particularly problematic for health managers, who have no systematic way to monitor the progress of the CMWs under their supervision. Indeed, how to best measure performance in developing countries, such as Sudan, remains a highly debated topic in the literature. Specifically, there remain significant gaps in how performance is conceptualised. The current knowledge gaps around what factors makeup performance and what determines performance represent critical issues in performance measurement. Therefore, the goal of the current research was to develop a practical measure of the performance of CMWs in Sudan.

In light of the challenges mentioned above and the recognised role of performance as a priority area to strengthen human resources for health (HRH) in Sudan, this thesis first reviews the current landscape of HRH, its challenges, and identifies current gaps in performance knowledge, policy, and practice, as well as presents current debates within performance measurement, theories, and frameworks. This is followed by an in-depth contextual description of national Reproductive, Maternal, and Child health (RMCH) trends over time, set against the recent geopolitical climate, and a review of relevant RMCH research, policies,

strategies, and programmes in Sudan. The current study then adopts an implementation research approach using mixed-methods across three distinct research phases: an exploratory phase, a tool development phase, and the tool testing phase. As part of the exploratory phase, the first research objective was to determine what factor(s) constitute 'performance' of maternal health workers in low and middle-income countries. This was achieved through a systematic review of the performance literature, focusing on maternal health care providers in low and middle-income countries (LMICs). Results of the systematic review identified sixteen key constructs, used to measure RMCH cadre performance across LMICs. The majority of studies (n = 26) measured the quality of care (n = 24) as a principal measure of performance. Health worker knowledge (n = 17), skills (n = 10), competency (n = 7), job satisfaction (n = 7), compliance (n = 3) and motivation (n = 4), also featured among the most commonly measured components of performance. Results highlight inconsistencies within the literature as to whether these constructs are best conceptualised as direct observations of performance or as determinants of performance.

The second objective was to determine what factor(s) constitute 'performance' of community midwives in Sudan. A series of key informant interviews (KIIs), focus group discussions, and participatory workshops were conducted with key stakeholders. This resulted in the identification of availability, accessibility, and acceptability as essential prerequisites for the measure of performance of CMWs in Sudan. Determinants of performance identified were categorised as either contextual, from both the supply or demand side of the health system, or individual/motivational factors. Demand side contextual determinants potentially influencing the performance of the CMW included socio-cultural health beliefs, diet norms, access to clean water, taboos around family planning, financial hardship, choice of healthcare, and having previously experienced mistreatment from a health worker. Key informants further identified the remuneration, quality of training of the CMWs, work environment, including access to health facilities, and availability of consumables, as performance determinants. Individual/motivational factors, on the other hand, included seven components that reflected the motivation of CMWs to choose this profession. These include pride, appreciation, funding opportunity, and happiness in helping others, saving lives, and combating harmful traditional practices.

The results were synthesised with the results of the systematic literature review to propose a theoretical framework for the measure of CMW performance in Sudan,

depicting both the determinants and components of performance for CMWs in the context of Sudan. The identified performance of CMWs in Sudan consists of three primary constructs: knowledge, competency, compliance, as determined by job satisfaction, supervision, and motivation. During the tool development phase, and aligned with implementation research, participatory approaches with key stakeholders, including reproductive health state coordinators, policy makers, community midwives, and beneficiaries, were again used to develop contextually relevant items for each of the constructs represented by the theoretical framework derived during the exploratory phase. The results of this phase yielded an initial version of a tool to measure performance among community midwives in Sudan. In specific, the tool was developed to measure aspects of CMW Knowledge (13-items), Compliance (11-items), Competency (6-items), as indicators of performance, as well as Job Satisfaction (15-items), Supervision (5-items), and Motivation (11-items), as determinants of performance. The resulting tool was subsequently taken forward for testing in the final phase of the thesis: The tool testing phase.

The fourth objective of assessing the validity of the performance measurement tool was realised through applying measurement modelling procedures. Responses gathered using the CMW performance measurement tool underwent latent variable modeling procedures, namely, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to determine the factor structure of the performance measure. Results supported a three-factor structure of performance, characterised by 'Know-How,' 'Know-what,' and 'Will-To' factors. A revised theoretical framework describing the determinants and components of performance of community midwives in Sudan is presented.

This study contributes to existing knowledge by developing a contextually relevant tool to measure community midwives' performance in Sudan. In the short term, it is expected that the results of this study will be used to inform national policy, management and training programmes, while also contributing to the growing literature in the area of health worker performance by identifying and measuring the performance of frontline maternal health workers in similar low-resource settings. New knowledge derived from this thesis is of particular relevance to NGOs, governments, policymakers, and health programme implementers focused on health worker performance improvement. In the long-term, it is expected that the results of this study will contribute to better performance monitoring and better human resource management, both nationally and internationally.

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List of Abbreviation

AHS	Academy of Health Sciences
AMC	Army Medical Corps
BDN	Basic Development Need
CAHP	Council for Allied Health Professions
CCS	Chamber of Civil Service
CFA	Confirmatory Factor Analysis
CHW	Community Health Worker
CMW	Community Midwife
DCE	Discrete Choice Experiment
EFA	Exploratory Factor Analysis
FMoH	Federal Ministry of Health
GFATM	Global Fund to fight AIDS, Tuberculosis and Malaria
GHWA	Global Health Workforce Alliance
GHWN	Global Health Workforce Network
GOBI	Growth monitoring, Oral rehydration, Breastfeeding, Immunisation
HEW	Health Extension Worker
HRDD	Human Resources Development Directorate
HRH	Human Resources for Health
HV	Health Visitor
HWF	Health Workforce
ILO	International Labour Organisation
IMF	International Monetary Fund
INGO	International Non- Governmental Organisation
IR	Implementation Research
JLI	Joint Learning Initiative
LMIC	Low and Middle-Income Countries
MA	Medical Assistant
MDGs	Millennium Development Goals
MDR	Maternal Death Review
MoF	Ministry of Finance
MoHE	Ministry of Higher Education

MoL	Ministry of Labour
NCT	National Council for Training
NGO	Non-Governmental Organisation
NHRHO	National Human Resources for Health Observatory
NMW	Nurse Midwife
NRHP	National Reproductive Health Programme
OECD	Organisation for Economic Co-operation and Development
PHC	Primary Health Care
RH	Reproductive Health
RMNCH	Reproductive, Maternal, Neonatal and Child Health
SAP	Structural Adjustment program
SDGs	Sustainable Development Goals
SDU	Sudan Doctors' Union
SHSPTU	Sudan Health and Social Professions Trade Union
STA	Sudanese Technicians Association
SMoH	State Ministry of Health
SMC	Sudan Medical Council
SMSB	Sudan Medical Specialisation Board
TBA	Traditional Birth Attendant
TDR	Special Programme for Research and Training in Tropical Diseases
UNFPA	United Nations Population Fund
UHC	Universal Health Coverage
UNICEF	United Nations Children's Fund
VMW	Village Midwife
WaSH	Water, Sanitation and Hygiene
WHO	World Health Organisation

1 Chapter One Introduction

Background

In response to the critical global shortage of human resources for health (HRH), the World Health Organisation declared 2006-2015 the 'Health Workforce Decade' (WHO, 2006a). The WHO intended to draw attention to existing global health workforce deficits, the geographical misdistribution of existing health workers, skill-mix imbalances, and persistent issues of workforce performance, retention, and migration. The global human resources for health (HRH) movement that ensued led to the launch of several HRH platforms, including the Global Health Workforce Alliance (GHWA) in 2006, the adoption of the Agenda for Global Action at the 1st Global Forum for HRH in Kampala in 2008, as well as the "G8 commitment to action on health worker shortage" in 2008.

In the year 2010, the "WHO Code of Practice on the International Recruitment of Health Personnel" was adopted at the 63rd World Health Assembly (WHA), and the "Global Policy Recommendations for Rural Retention" was launched. The Recife Political Declaration was endorsed during the 3rd Global Forum for HRH in 2013, leading to the development of the "Global Strategy on Human Resources for Health: Workforce2030", launched in May of 2016 (WHO, 2016). Today, and following on from the Millennium Development Goals (MDGs) and the post-2015 agenda, addressing the critical shortage of HRH remains a critical requirement to achieve Universal Health Coverage (UHC). Specifically, the need to recruit, develop, train, and retain health workers in low and middle-income countries (LMICs) fundamental towards achieving UHC while also valuing the concept of people-centred and integrated health services (UN, 2016).

Despite the momentum, global efforts are still short of addressing the estimated shortage of 18 million health workers (Buchan et al. 2017). The global shortage of health workers threatens the achievement of most of the SDGs, and in particular, SDG 3 on good health and wellbeing^[1] (UN, 2016). This projected

¹ Sustainable Development Goal 1: No Poverty, SDG 2: Zero Hunger, SDG 3: Good Health and Well-Being, SDG 4: Quality Education, SDG 5: Gender Equality, SDG 8: Decent work and Economic Growth, SDG 10: Reduced Inequalities, SDG 11: Sustainable Cities and Communities and SDG 17: Partnerships for the Goals. Retrieved on 1st February 2019 <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>from

shortfall, therefore, acts as one of the most pressing obstacles preventing the attainment of universal health coverage (UHC) ([WHO, 2016b](#), [2016c](#)). This shortage is especially felt in rural, remote, and socio-economically deprived areas ([WHO, 2014b](#), [2016b](#)). The most affected region will likely remain sub-Saharan Africa, which with its population growth and change in morbidity and mortality profile, is poised to experience a projected shortfall of 3.7 million health workers by 2030 ([WHO, 2014b](#), [2016b](#)).

Whereas increasing the number of health workers through additional training is a fundamental long-term approach, this requires a significant amount of resources and time. In the interim, improving the performance of existing health workers offers an essential short-term solution to the HRH crisis ([WHO, 2006b](#), [2015b](#)). Indeed, the performance of health care providers is one of the main reasons why many low-income countries failed to reach the health-related MDGs ([WHO, 2015b](#)). As such, the health workforce's performance is the first objective of the "Global Strategy on Human Resources for Health: Health Workforce 2030". Specifically, the Global Strategy aims "to optimise performance, quality, and impact of health workforce through evidence-informed policies in human resources for health" (WHO, 2015, p. 4).

1.1 Human Resources for Health in Sudan

Like many other LMICs, Sudan faces a severe health workforce shortage and a skewed geographical distribution of its health workforce: nearly 70% of health workers serve only 30% of Sudan's population. The case is best illustrated among physicians, where 62% of specialists practice in Sudan's capital, Khartoum, leaving the remaining 38% to serve Sudan's other 17 states ([FMoH, 2006](#)). The ratio of doctors, nurses, and midwives stands at 0.314 per 1000 population, well below the WHO's threshold for the critical shortage, defined as 2.3 per 1000 ([WHO, 2006b](#), [2017b](#)). By way of comparison, Ireland's physician density per 1000 population stands at 2.961 ([FMoH, 2017c](#); [WHO, 2017b](#)). Also, Sudan faces a skill-mix imbalance ratio of 4:1 doctors to nurses, the inverse of the recommended benchmark of 1:4 doctors to nurses ([FMoH, 2017c](#); [WHO, 2006b](#)). Performance measurement identified as the weakest area in human resource management in

Sudan. As a result, performance measurement is a National Health sector strategic objective targeted for improvement: '*Strategic Objective 6.3 HRH management systems, including individual performance systems, are improved*' ([FMoH, 2012a](#)). It is one of the strategic objectives of the national HRH strategy '*Strategic Objective 3: Improve individual performance management*' ([FMoH, 2012b](#)) and a research priority on the national HRH priority research list ([FMoH, 2015a](#)).

Unlike other LMICs, however, Sudan's health workforce shortage is not due to a lack of production. The country possesses more than 60 medical schools with an annual graduation rate of over 4000 doctors. More than 5000 residents are undergoing specialist training within the Sudan Medical Specialisation Board at any given time, and the Academy of Health Sciences has an annual intake of over 5000 allied health professions. The complexity of the health workforce landscape, the country's volatile geopolitical climate, and an unfavorable health labor market marked by weak absorption capacity within the public sector, poor retention policies, and a significant migration of health workforce, all contribute to the estimated 60% of Sudan's doctors choosing to practice outside of the country. Moreover, current trends suggest that mass migration of the health workforce is not limited to doctors, with nurses, midwives, and allied health professionals all increasingly seeking work outside the country ([AbuAgla et al., 2013](#); [AbuAgla, 2013](#); [FMoH, 2017c, 2018](#)).

In an attempt to address this shortage, the primary health care (PHC) expansion programme launched in 2013. Under this programme, the coverage of the population with PHC facilities was to increase from 86% to 100%, and an increase in the coverage of a minimum package of PHC services to increase from 24% to 100%. The programme has since reached over 90% of its coverage target indicators, mainly through building health facilities and producing three new cadres of frontline health workers: community health workers (CHWs), medical assistants (MAs), and community midwives (CMWs). In the context of Sudan, CMWs are responsible for providing preventive, promotive, and curative care for women and children individually and in the community through delivering RMNCH services and the integrated PHC package to every village throughout Sudan. As the programme comes to an end in 2020, there is a national need to reflect on the deployment, acceptability, accessibility, and performance of the CMW cadre.

1.2 Statement of the Problem

Achieving universal health coverage, designing people-centred health systems, and meeting SDG3 represent some of modern-day's most pressing global health challenges. The performance of the health workforce is listed as a top priority to address these challenges. Despite performance appearing as a priority area in Sudan's National Health Sector Strategy, however, to date, no performance measure has been established at the Federal or State ministry of health level. Performance measurement is particularly problematic for health managers, who have no systematic way to monitor the progress of the health workforce, including CMWs under their supervision. Indeed, how to best measure performance in HRH-poor contexts, such as Sudan, remains a highly contested topic in the literature, and research on how to optimise health provider performance in LMICs remains scarce. Specifically, there remain substantial gaps in how performance is conceptualised. For example, whereas the global HRH strategy 2030's conceptualises the health workforce's performance through its components of availability, accessibility, acceptability, and quality (WHO, 2015), others have defined performance in terms of job outcomes, including self-esteem and job satisfaction.

While developing key indicators of performance is essential to measure progress towards attaining the SDGs, a debate persists as to whether performance is best conceptualised as a global, standardised indicator for ease of comparability across contexts or whether context or cadre-specific measures, such as performance measures specific to community midwives, are more appropriate. The current knowledge gaps around what factors makeup performance and what determines performance represent essential performance measurement ([Rowe et al., 2005](#)). This study aims to contribute to addressing some of these gaps.

1.3 Research Goals and Objectives

In light of the challenges mentioned above, and the recognised role of performance as a priority area to strengthen HRH in Sudan, the current research aims to develop a practical measure of performance for community midwives in

Sudan. To achieve this goal, the current study is divided into three distinct phases, towards the achievement of four specific research objectives:

Objective 1: To determine what factor(s) constitute 'performance' of maternal health workers in low and middle-income countries.

Objective 2: to determine which of these factors are most relevant to defining the performance of community midwives in Sudan.

Objective 3: To develop a contextually-relevant tool to measure performance among community midwives in Sudan.

Objective 4: To assess the construct validity of the tool to measure performance among community midwives in Sudan.

1.4 Significance of the Study

This study contributes to existing knowledge by improving our understanding of health worker performance and by developing a contextually relevant tool to measure the performance of community midwives in Sudan. In the short term, it is expected that the results of this study will be used to inform national policy, management and training programmes, while also contributing to the growing literature in the area of health worker performance by identifying and measuring the performance of frontline maternal health workers in similar low-resource settings. New knowledge derived from this thesis is of particular relevance to governments, non-governmental organisations (NGOs), policymakers, and health programme implementers focused on health worker performance improvement. In the long-term, it is expected that the results of this study will contribute to better performance monitoring and better human resource management, both nationally and internationally.

1.5 Structure of the Thesis

This thesis describes the process and steps undertaken throughout the development of a practical measure of performance among community midwives working in a low-resource setting (i.e., Sudan) using implementation research approaches. The research was conducted over three distinct phases, presented across seven chapters:

Chapter Two offers an in-depth contextual understanding of Sudan's RMNCH landscape and highlights current national efforts toward the Sustainable Development Goals (SDGs). Following a broader review of the global HRH for RMNCH literature, the chapter presents an extensive desk review of key documents and policies of the health system of Sudan, with a focus on reproductive, maternal, neonatal, and child health (RMNCH) policies and systems. It describes the contextual, physical, and socio-economic structure in which the health system operates while documenting the evolution of RMNCH cadres and their associated policies. More importantly, this review of key policies and documents serves as a key stakeholder-mapping tool, used to identify those individuals that were subsequently included in the co-development of the CMW performance measure. These essential documents and policies are then set against extant performance literature. Current debates within the health worker performance literature, including performance measurement, theories, and frameworks, are presented, compared, and contrasted between and within disciplines of organisational/industrial psychology, human resource management, health economics, and occupational health.

Chapter Three outlines the methods applied in the study. It describes the overarching methodological approach adopted in the thesis, the underpinning philosophy, epistemology, and the systems-thinking approach central to implementation research. It describes the mixed-method design used across the three implementation research phases of the study, including the exploratory phase, the tool development phase, and the tool testing phase. A description of the participants, data collection tools, data analysis, and ethical considerations are presented for each phase.

Chapter Four: Exploratory Phase-Results 1 This chapter presents the results of the exploratory phase, including the results of a systematic literature review carried out to determine what factor(s) constitute 'performance' of maternal health workers in low and middle-income countries (LMICs), in the achievement of the first research objective. The systematic review asked: What are the common factors used to measure maternal health workers' performance in low and middle-income countries? The results of the systematic review were therefore used to identify what construct(s) are used in LMICs for the measure of performance, how

these are measured, and what tools, if any, currently exist to measure health worker performance.

Chapter Five: Exploratory Phase-Results 2 The chapter presents the results of a series of key informant interviews (KIIs) focus group discussions and participatory workshops conducted with participants from both the supply and demand sides of the health system, including health system stakeholders, reproductive health (RH) state coordinators, beneficiaries, and community midwives. The results of the systematic review, the stakeholders' participatory interviews, focus group discussions, and workshops are then synthesised with the performance literature to propose a theoretical framework for the measure of CMW performance in Sudan, in fulfilment of the second research objective. This theoretical framework is then carried forward in the subsequent phases of the thesis.

Chapter Six: Tool Development Phase: Following on from the performance-related constructs identified in Chapter 5, this chapter presents the results of an intensive round of stakeholder consultation used to identify and develop each performance measure item, while continuing to ensure a rigorous, participatory process, in line with an implementation research approach. The outcome is an initial version of a contextually-relevant performance measurement tool for community midwives in Sudan, as per research objective three.

Chapter Seven: Tool Testing Phase presents the results of the tool testing process. Responses gathered using the CMW performance measurement tool were subjected to latent variable modelling procedures, namely, Exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA), to determine the factor structure of the performance measure. This chapter, therefore, addresses the fourth objective of the study by presenting a practical measure of performance, developed using participatory procedures, which was subsequently endorsed by the Sudanese Federal Ministry of Health. The chapter reports on the performance measures of 180 community midwives, assessed across Gedarif and White Nile states.

Chapter Eight discusses the overall findings of the study in light of the existing body of literature and their implications for theory, policy, and practice. A revised theoretical framework describing the determinants and components of

performance of community midwives in Sudan is derived and presented. The implications of the findings for future research and limitations of the current study are also discussed. The chapter concludes with reflections on the main empirical findings and conclusions of the study and highlights the unique contribution of the study to the current body of knowledge.

2 Chapter Two: Literature Review

Introduction

This chapter is composed of three main sections. The first section (Section 2.1) gives an overview of the human resource for reproductive health (RH) landscape globally, highlighting historical and current challenges. This literature is reviewed with a special focus on reproductive health in the context of the Sustainable Development Goals (SDG) era and on reproductive health in low- and middle-income countries (LMICs).

This is followed by a detailed description of the setting under study (Section 2.2): Sudan's reproductive, maternal, neonatal and child health (RMNCH) system. It describes the contextual, physical, and socio-economic structures in which Sudan's health system operates. Resulting from a review of documents and policies available from within the Federal Ministry of Health in Sudan, the evolution of the RH cadre in this context, including recent reviews to RMNCH policies, strategies, and programmes are also presented. The mapping of key policies that underpin current RMNCH practices in Sudan thus serve to map the key RMNCH stakeholders in Sudan targeted for consultation during the exploratory phase of the study.

The third section (Section 2.3) reviews different definitions of individual work performance and its main characteristics, comparing and contrasting existing theories and frameworks that are currently used in the measurement of performance of maternal health workers in LMICs. Collectively, this chapter offers an in-depth contextual understanding of the RMNCH landscape and current national efforts towards attaining the SDGs, as well as an in-depth analysis of the national RMNCH trends over time, against the geo-political climate in Sudan.

2.1 Human Resources for Health

2.1.1 Reproductive, Maternal, Neonatal and Child Health

Ensuring good maternal and child health remains one of modern history's most important challenges. Annual global maternal and child deaths remain

unacceptably high: 295,000 maternal deaths, 2.6 million stillbirths, 5.3 million deaths in children under the age of five—including 2.7 million new-born deaths—and 0.9 million adolescent deaths (UN, 2015). Over 800 women die daily from complications of pregnancy and childbirth and, for each woman who dies, an additional 20 suffer from serious pregnancy-related complications, injuries, and infections (UNICEF, 2017).

Maternal and child deaths are largely preventable; a by-product of poverty, with 99% of maternal deaths occurring in developing regions (UNICEF, 2017). Specifically, sub-Saharan Africa and South Asia account for 88% of the maternal deaths, with the former reaching 201,000 maternal deaths per year. Such discrepancies both within and across regions are reflective of large economic inequities, where a lifetime risk of maternal death in low-income countries stands at 1/180, compared to 1/4900 in high income countries (WHO, 2018b).

Many national governments have signed up to the 17 Sustainable Development Goals (SDGs) 2016-2030. The SDGs were first proposed in the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 as a global action to end poverty, protect the planet, and work towards achieving global peace and prosperity from 2016-2030 (UN, 2017). The SDGs are considered an extension of the eight Millennium Development Goals (MDGs), prioritised from 2000-2015 (UN, 2017). Building on the success of the MDGs, the SDGs act as a universally agreed upon set of goals and indicators through which to assess human improvement. While the MDGs aimed to alleviate poverty, combat leading communicable diseases, and improve maternal and child health, among other development goals, the SDGs further speak to the urgent environmental, economic and political challenges we are facing. Despite the MDGs unprecedented achievements, especially on measures of poverty reduction and Water, Sanitation and Hygiene (WaSH), MDG 5 (improve maternal health) was only achieved in nine out of the 95 countries identified as having high level of maternal mortality in 1990. (WHO, 2014b, 2015b). With only 10 years remaining to meet the SDGs, governments have set ambitious targets to reduce the global maternal mortality ratio to less than 70 per 100,000 live births, to reduce neonatal mortality to 12 per 1,000 live births, and under-5 mortality to 25 per 1,000 live births by 2030 (UN, 2017).

National governments, policy makers and donors increasingly recognise the need to address HRH challenges, including issues of HRH availability and performance, if they are to achieve the SDGs (WHO, 2014b, 2016b). Specifically, SDG 2 (end hunger, achieve food security and improved nutrition, and promote sustainable agriculture), SDG 3 (ensure healthy lives and promote wellbeing for all at all ages), SDG 4 (ensure inclusive and equitable quality education and promote lifelong opportunities for all), SDG 5 (achieve gender equality and empower all women and girls), SDG 6 (ensure availability and sustainable management of water and sanitation for all), and SDG 8 (promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all) all rely, in some way, on well-performing human resources for health (De Francisco Shapovalova, 2015; Campbell et al., 2015; UN, 2015, 2017; WHO, 2015a, 2016b). Arguably, SDG 3 especially requires greater and more strategic investments in the health workforce.

The concept of universal health coverage (UHC) is particularly central to SDG3, which sets one of its target indicators as the “coverage of essential health services”. SDG 3 thus necessitates equitable access to and use of quality essential health services, delivered by a sufficient number of HRH that are fit-for-purpose and fit-for-practice (UN, 2017; WHO, 2014b). Appropriately, SDG 3C targets substantial increase in health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States (UN, 2017). It is widely recognised however, that these goals are only achievable through a multi-sector approach that works to strengthen health system resilience, workforce, stewardship, financing, information, and supply chains (Campbell et al., 2016; WHO, 2007).

2.1.2 Human Resources for Health: Who are they?

Human resources for health (HRH) are the heart of the health system; without them, no health system exists, nor will the health of a population be attained ([WHO, 2014b](#)). Also known as the health workforce or health workers, HRH is defined by several organisations, institutions, and scholars. In the current thesis, the terms Human Resources for Health, health workforce, and health workers are used interchangeably. Among the most widely used definitions are those set by

the World Health Organisation (WHO), the International Labour Organisation (ILO), and the Organisation for Economic Co-operation and Development (OECD) and are summarised in Table (1). While all three definitions include formal health providers and support workers, the ILO definition further specifies that the health worker includes both paid or unpaid workers, where non-health occupations (NHO) workers are employed in the broader health economy within or outside the health sector. The OECD further acknowledges the social sector within its definition.

Table 1 Definitions of health workers

Organisation	Definition of health workers
WHO	<i>"All people engaged in actions whose primary intent is to enhance health. This includes physicians, nurses and midwives, but also laboratory technicians, public health professionals, community health workers, pharmacists, and all other support workers whose main function relates to delivering preventive, promotive, or curative health services"</i> (WHO, 2006b)
ILO	Those working both within health occupations (HO workers), such as doctors and nurses, and outside of the health and social sectors, non-health occupations (NHO workers) who produce goods such as pharmaceuticals and provide services such as cleaning, whether paid or unpaid, (WHO, 2016d)
OECD	All people working in specific health occupations in the health and social sectors (WHO, 2016d)

2.1.3 Human Resources for Health: Historical Landscape and Challenges

Despite the importance of the health workforce as an essential input and building block of health systems ([WHO, 2007](#)), HRH was a largely neglected area of health system strengthening post the Alma Ata Declaration of 1978. This is largely attributed to the substantial costs associated with training and incentivising health workers and the delayed realisation of their role as the invisible backbone of the health system ([WHO, 2006b, 2016d](#)).

It was not until 2006, following the publication of the Joint Learning Initiative (JLI) report in 2005, which shed light on health workforce challenges, that more considerable attention was geared towards global action on HRH. In recognition of the health workforce's importance, the WHO titled their 2006 World Health Report, "Working Together for Health" ([WHO, 2006b](#)), draws global attention to the

challenges facing human resources for health. At the time, 57 countries had a critical shortage of HRH, which was calculated based on a threshold of 23 health workers per 10,000 (WHO, 2006b). There was an estimated global deficit of 2.4 million doctors, nurses and midwives, and significant discrepancies between rich and developing countries. Africa was considered the epicentre of the crisis, with 36 of its 46 countries experiencing a critical shortage of HRH. Among the challenges identified in the WHO's 2006 report was the inequitable geographical distribution of HRH, whereby the areas with the highest burden of disease contained the lowest rate of health workers per capita ([WHO, 2006b](#)). Africa, which harboured 24% of the global burden of disease, hosted only 3% of the health workers and 1% of the world's health financing ([WHO, 2006b](#)). By comparison, the United States had 10% of the global burden of disease but hosted 37% of the health workers and 50% of the world's health financing ([WHO, 2006b](#)). There was also evidence of severe skill-mix imbalances within health teams ([WHO, 2006b](#)). Compared to the benchmark ratio of four nurses to one doctor, eight nurses' ratios to one doctor were common in Africa, and there were 1.5 nurses to one doctor in the Western Pacific Region ([WHO, 2006b](#)).

Globally, estimates showed that two-thirds of the health workers employed in the public sector, with the remaining third in the private sector ([WHO, 2006b](#)). The discrepancies in salaries present across the public and private sectors contribute to low motivation and morale and adversely affect health worker performance ([WHO, 2006b](#)). Further imbalances also existed across the sexes, where 70% of doctors were male, and 70% of nurses were female ([WHO, 2006b](#)). This further reflected the discrepancies between health professionals and highlighted the need to create more female-friendly work environments ([WHO, 2006b](#)).

In response to these challenges, the Global Health Workforce Alliance (GHWA) was formed in 2006. Hosted by the WHO, the GHWA is a partnership of national governments, civil society, international agencies, finance institutions, researchers, educators, and professional associations dedicated to identifying, implementing, and advocating for solutions to HRH challenges globally ([WHO, 2006a](#)).

2.1.4 Working together for Health: A decade of action 2006-2015

The launch of the aforementioned World Health Report 2006 “Working Together for Health” marked a global commitment towards improving HRH. In response, the international community launched several initiatives, forums, alliances, and networks and declared 2006-2015 a “decade of action”. Table (2) offers a timeline, summarising the key milestones for the HRH movement in support of the HRH agenda globally, with a focus on Africa. Today, this movement continues to draw attention to the challenges and solutions in the health workforce arena and has galvanised change at local, country, regional and global levels.

Table 2 A Timeline of Key Events to address the HRH crisis in Africa and globally

Year	Key Event	Description of Declaration/Code/Alliance	Source
2001	The Abuja Declaration: Ten Years On	Endorsed for increasing financial resources for health	(WHO, 2001)
2006	Global Health Workforce Alliance (GHWA)	Formed partnership of national governments, civil society, international agencies, finance institutions, researchers, educators and professional associations dedicated to identifying, implementing and advocating for solutions to HRH challenges globally	(WHO, 2006a)
2006	Maputo Plan of Action (MPoA) 2007 – 2010 (further extended to 2015 to coincide with the MDGs)	Endorsed in Khartoum, Sudan Ministers of Health of the African Union (AU) recommend health workforce development in Africa using a multisector response for Universal Access to Comprehensive Sexual and Reproductive Health Services in Africa	(Union, A. 2015)
2008	Ouagadougou Declaration	Endorsed Ouagadougou Declaration on Primary Health Care and Health Systems, which identifies HRH as a major priority to develop, invest and manage	(WHO, 2008b)
2008	Kampala Declaration	Endorsed at the 1 st global HRH forum as an agenda for global action against HRH challenges to build political commitment, mobilise resources and address obstacles through 6 strategies within a decade	(WHO, 2008a)
2010	International Code of ethical recruitment of health personnel	Adopted by the 63rd World Health Assembly on 21 May 2010. The Code aims to establish and promote voluntary principles and practices for the ethical	(WHO, 2010)

		international recruitment of health personnel and to facilitate the strengthening of health systems	
	WHO retention guidelines launched in 2010	16 evidence-based recommendations on how to improve the recruitment and retention of health workers in underserved areas. It guides policy makers to choose the most appropriate interventions, and to implement, monitor and evaluate their impact over time	
2012-2025	Road map for scaling up human resources for health for improved health service delivery in the African Region	Adopted by the Sixty-second session of the Regional Committee outlines priority areas of intervention for its secretariat. One of these areas is supporting the strengthening of health systems based on the primary health care approach, addressing, among other issues, the HRH challenges	(WHO, 2014a)
2013	Recife Political Declaration	The Recife Political Declaration on Human Resources for Health: Renewed commitments towards universal health coverage adopted in the 3 rd global forum on HRH in Brazil	(WHO, 2013a)
2016	Global Health Workforce Strategy: 2030	The first global HWF strategy endorsed by member states	(WHO, 2016b)
2016	Global health Workforce Network	GHWN formed in 2016 in succession to GHWA, to carry a similar mandate and assist in implementation of the Global HWF strategy	(WHO, 2016a)
2017	Dublin Declaration	The Dublin Declaration endorsed at the 4 th global Forum on HRH: Building the Health Workforce of the Future SDG 2030	(WHO, 2017a)
2018	Astana Declaration on PHC	Astana Declaration on Primary Health Care: From Alma-Ata towards Universal Health Coverage and the Sustainable Development Goals, endorsed including focus on HRH	(WHO, 2018a)

2.1.5 Human Resources for Health: From the MDGs to the SDG-era

Today, the HRH challenge is approached more strategically, generating HRH evidence, identifying HRH stakeholders, and appreciating multi and inter-sector ownership, all of which reflect essential changes since 2006. Appreciation of the health workforce as an area of study and as a standalone component of the health system is also visible in major donor plans and budgets. For example, a health system strengthening component which includes a health workforce

module is present in the global fund to fight AIDS, Tuberculosis, and Malaria (GFATM) ([GFATM, 2018](#)) .

The Global Health Workforce Network (GHWN) represents the next generation of the GHWA, which ended its 10-year mandate in 2016. The GHWN currently operates within the WHO to support multi-sector dialogue and global action to implement the “Global Strategy on Human Resources for Health: Workforce 2030” and the recommendations of the High Level Commission on Health Employment and Economic Growth ([WHO, 2019a](#)). Increasingly, there are national attempts to develop HR information systems within global, regional, and national health observatories. Furthermore, more substantial efforts exist to develop HRH strategies aligned to Workforce 2030, including regional HRH strategies and national country strategies, HRH related implementation plans, national HWF accounts, and attempts to project future HRH needs ([Bhatnagar et al., 2018](#); Siyam & Dal Poz, 2014; [WHO, 2006b, 2014b, 2016b, 2019b](#)).

The past decade has also seen significant investment in the global health workforce. Improved global investment in HRH reflected an increase in health workers' numbers, with a noted change in the 57 countries previously identified as experiencing a critical shortage ([WHO, 2006b, 2014b, 2016b](#)). Notably, many countries have implemented the strategy of introducing allied health workers, as an effective approach to address the skill-mix imbalance described in the World Health Report as “the skills of limited yet expensive professionals not well matched to the local profile of health needs” ([WHO, 2006b](#)) (p 18). By introducing a new, lower cadre of health worker, governments can reduce the time, cost and qualifications necessary to deliver evidence-based care practices ([Carrera et al., 2012](#); [Chopra et al., 2012](#); Fulton, 2011; [Lehmann et al., 2009](#); [McPake et al., 2015](#)). Moreover, creating a different category of cadre whose professional qualifications are not necessarily recognised outside of the country of origin can further help curb HRH migration, placing more health workers within communities and on the frontlines of primary care, where they are most needed ([Allen, 2008](#); Fulton, 2011; [Gilks, 2006](#); [Sousa et al., 2014](#)).

The practice of 'delegating tasks to existing or new cadres with either less training or narrowly tailored training' is known as task-shifting (Fulton, 2011, p. 2). Task-shifting is repeatedly found to be an effective way to deliver general or

specific health services across preventive, promotive, or curative care, while relieving specialists, or more highly-trained health workers, of some of these responsibilities. The effectiveness of task-shifting has been replicated globally with health extension workers (HEW) in Ethiopia, village midwives (VMW) in Indonesia, community health workers (CHW) in Kenya and ASHA's in India, to name only a few (Bhattacharya & Ramachandran, 2015; Callaghan & Schneider, 2010; [Geurts-Laurant et al., 2004](#); Fulton, 2011; [Lewin et al., 2010](#); [McPake et al., 2015](#); Singh & Sachs, 2013; [WHO, 2014b](#)).

Retention schemes have been developed to equilibrate the geographical distribution of HRH within countries to offer a more balanced rural to an urban ratio ([WHO, 2006b](#)). Research and methodologies, including the use of discrete choice experiments (DCE) borrowed from business models and research in the field of markets, environmental economics, and transport, have been applied in many countries to determine working condition preferences to improve health worker retention ([Kruk et al., 2010](#); Mandeville, Lagarde & Hanson, 2014). Examples of retention strategies include financial incentives as salary top-ups, non-financial incentives such as continuing education and training opportunities for health workers, promoting the recruitment of students from rural areas, compulsory national service and strengthening health system governance (Dieleman & Harnmeijer, 2006; [JLI, 2004](#); Mandeville et al., 2014; [Ferrinho et al., 2004](#); [WHO, 2006b, 2016b](#)). To date, HRH retention remains a significant challenge facing national health systems. Efforts are made to improve the quantity, quality, and relevance of health professional education (HPE) ([WHO, 2013b, 2014b](#)).

Globally, many richer countries continue to engage in active recruitment of health workers from low or middle-income contexts to address their shortages in less favoured settings or specialties (Siyam & Dal Poz, 2014; Tankwanchi, Vermund & Perkins, 2015; [WHO, 2010, 2016b](#)). These migration patterns of out-flowing health workers from source to destination countries have also had negative returns for health systems in source countries ([Siyam et al., 2013](#); Tankwanchi, et al., 2014; [WHO, 2006b, 2010](#)). The endorsement of the *WHO Global Code of Practice on the International Recruitment of Health Personnel in 2010* signals an effort towards more ethical recruitment practices across countries, including an effort to discourage active recruitment from countries facing critical shortages of health workers, while enhancing partnership and promoting health

system development between source and destination countries ([WHO, 2010](#)). However, the non-binding nature of the *WHO Global Code of Practice on the International Recruitment of Health Personnel* means that there is inconsistent implementation of its principles across countries. Indeed, some have noted an increase in the number of migrating skilled health professionals in recent years with unsatisfactory implementation of the Code ([Abuagla & Badr, 2016](#); [WHO, 2010](#)).

The High-Level Commission on Health Employment and Economic Growth argue for the importance of investing in health workers as a form of long-term investment. Specifically, they suggest that investing in health workers will stimulate economic growth through health, social, and economic pathways ([WHO, 2016d](#)). The idea of health as an investment is mainly echoed in other national and international policy documents, including the *Global Strategy on Women's, Children's and Adolescents' Health*, which promises a return on the initial investment by 2030 through (i) an end to preventable maternal, new-born, child and adolescent deaths and stillbirths; (ii) a minimum ten-fold return on investments through better educational attainments, workforce participation, and social contributions; (iii) US\$100 billion in demographic dividends from investments in early childhood and adolescent health and development; and an (iv) "grand convergence" in health, giving all women, children, and adolescents an equal chance to survive and thrive ([WHO, 2015a](#)).

Despite significant advancements and the establishment of essential policies and practices to try to curb the adverse effects of insufficient human resources for health globally, several key challenges remain. Including, critical shortage, skill-mix imbalances, and geographical maldistribution. Furthermore, challenges remain for how to maximise the performance of current HRH to deliver a good standard of care while maintaining an enabling environment in the face of a depleting workforce. This is a global and national challenge in Sudan. The performance measurement of HRH in Sudan has been identified as a national priority determined in the national health sector strategy (2015-2018), national HRH strategy (2012-2016), national HRH research priority (2018-2021) and 10 in 5 Reproductive health strategy (2016-2020), justifying the need and urge to focus this particular study on HRH performance. The next section provides a comprehensive analysis through a detailed desk review to have a better understanding of the Sudan HRH landscape.

2.2 Human Resources for Health in Sudan

This section presents an in-depth analysis of the Sudanese health-system, exploring its different physical, socio-economic, and geopolitical contexts. Developed through a thorough desk-review of national documents, reproductive health policies, strategies, and laws published over the course of the last decade, many of which were only available in hardcopies located within the Federal Ministry of Health in Khartoum. This section further presents key health system development policies that underpin today's reproductive, maternal and child health in the country.

In addition, this section reviews how the country's health professional education has evolved to include different reproductive health cadres, available at various levels of the health system, with a special emphasis on the development of a new community midwife (CMW) cadre. Newly created to lead maternal and child health reform at primary health care (PHC) level, the CMW cadre was introduced in 2013 as part of the national PHC expansion programme to achieve UHC. The introduction of the CMW is considered especially important to overcome many of the aforementioned HRH for reproductive health challenges in Sudan. The outcome of this foundational desk review is thus used to generate a comprehensive RH stakeholder list for Sudan, as a key part of the implementation research (IR) process used in this thesis. This stakeholder list was thus used to establish which individual(s) should be engaged throughout the remainder of the research, in line with implementation research approaches.

I was given access to premises and resources of the RH and PHC Expansion Sub-Directorates of the PHC General Directorate, Federal Ministry of Health (FMoH), to further consult public documents, protocols, grey literature and reports. The desk review was primarily used to identify which key stakeholders should be involved in the tool development phase and was completed through consulting the following list of published and unpublished national documents, available within the Federal Ministry of Health (FMoH) through their offices in Khartoum:

- Reproductive and Maternal health service providers (National Health Sector Strategic Plan (NHSSP)2012-2016, PHC and UHC concept note)
- Reproductive and Maternal health status (CBS, SHHS, NHSSP);

- Reproductive and Maternal health service providers (NHSSP, PHC and UHC concept note)
- Reproductive and Maternal health policies and strategies (Road Map for reducing maternal and new-born mortality 2010-2015, NHSSP));
- Community Midwife (Curricula, Job description-FMoH/AHS/NRHP)
- Mapping of the production and employment of CMWs: through national figures availed from the Academy of Health Sciences, Reproductive Health Directorate, and PHC Directorates at the Federal Ministry of Health (FMoH).

A mapping exercise of the stakeholders in reproductive and maternal health (RMH) in Sudan was conducted to identify those directly involved with the new cadre, including community midwives themselves. Potential participants were selected according to their position, the professional body they represent, expertise in the field of study, and based on the following criteria:

- At the governance/policy level: individuals that put in place the policies, plans, and strategies related to reproductive and maternal health (RMH) in Sudan
- Individuals who hire, train and supervise community midwives
- Individuals who developed the training curricula for community midwives
- Experts in the field of human resources for health (HRH) and RMH in Sudan
- RMH stakeholders of international organisations
- Individuals who identify as community midwives
- Community members who stand to benefit directly from a community midwife's services (i.e. beneficiaries)

2.2.1 Physical Context

The Republic of Sudan is the third-largest country in Africa, with a land area of 1.882 million KM². Seven countries border Sudan, in addition to the Red Sea, located on the eastern coastal line, as shown in Figure (1). The country is comprised of 18 states and over 184 localities, with a diverse and vibrant multiracial and multicultural population ([FMoH, 2017b](#)). Sudan is an agricultural country where 80% of the population derives its income from agriculture, which, in turn, contributes to one-third of the country's GDP. The country is rich in natural resources, minerals, and livestock. Oil production in Sudan was considerable, but

most of its reserve was lost after the secession of Southern Sudan into an independent state in 2011 (2005 - 2011) (FMOH, 2012a).

2.2.2 Socio-economic Context

The percentage of the population living below the poverty line, defined by the World Bank as living on less than \$1.90 per day, stands at 46.5% (FMOH, 2012a; WB, 2019) and living below the extreme poverty line is 8%, i.e., living in severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education, and information (UN, 1995). Sudan spends only 9 % of its GDP on health, falling short of the 15% agreed on in the Abuja Declaration. The financial risk due to ill health is catastrophic, with an out-of-pocket expenditure reaching 75% of total health expenditure, where only 54% of the population has insurance (FMOH, 2017b, 2017c).

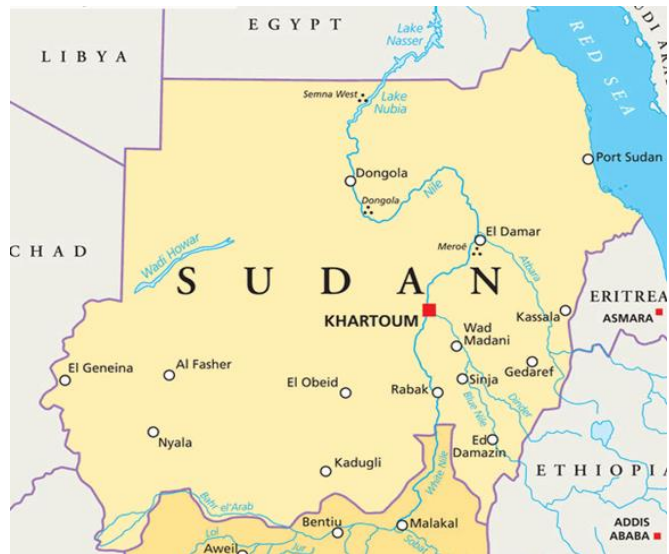


Figure 1 Map of Sudan

The secession of South Sudan has weighed heavily on the country's economy, with a loss of 75% of its oil revenue and a 30% gap in the national budget. Inflation rates have reached an unprecedented 68.9%, and the Sudanese pound devaluation jumped from 2.5 to 80 Sudanese pounds to the (USD) dollar within the last seven years (The, L. 2019). The country's changing economic status deeply affected the labour market, including all civil servants and health workers. Many of the latter were forced to supplement their income through dual practice and moonlighting (The, L. 2019; FMOH-Sudan, 2012a, NHA, 2008).

2.2.3 Health and demographic Context

Like many countries in the region, Sudan has a significant burden of communicable diseases and malnutrition (FMOH, 2017b). The leading causes of morbidity and mortality include malaria, tuberculosis, schistosomiasis, diarrheal

diseases, parasitic infections, and protein-energy malnutrition (FMoH, 2017a). Globalisation and growing urbanisation have brought changes to lifestyle and dietary practices, increasing the prevalence of non-communicable diseases (FMoH, 2017c). The country experiences regular episodes of emergencies due to natural disasters, including floods, and less often, droughts (FMoH, 2017a, 2017d). Epidemics such as diarrheal diseases, meningitis, and hemorrhagic fever persist seasonally (FMoH, 2017a, 2017b).

Internal conflicts in the bordering states also negatively impact health, especially in the Darfur and Blue Nile states. The life expectancy of a Sudanese citizen is 59 years, varying by social status, geographical distribution, and access to health services. Adult literacy stands at 69% (FMoH, 2017a, 2017d). A total of 61% have access to improved water supply (FMoH, 2017a, 2017d). As is the case globally, health indicators vary significantly between and across states, across wealth quintiles, and between urban and rural settings (FMoH, 2017c). Poor health outcomes resulting from improper health care, are, at least in part, attributable to the poor performance of the health workforce (JLI, 2004; Rowe et al., 2005; Ferrinho et al., 2004; WHO, 2006b). Table 3 below summarises some of the key health indicators for the country.

Table 3 Key Health Indicators for Sudan

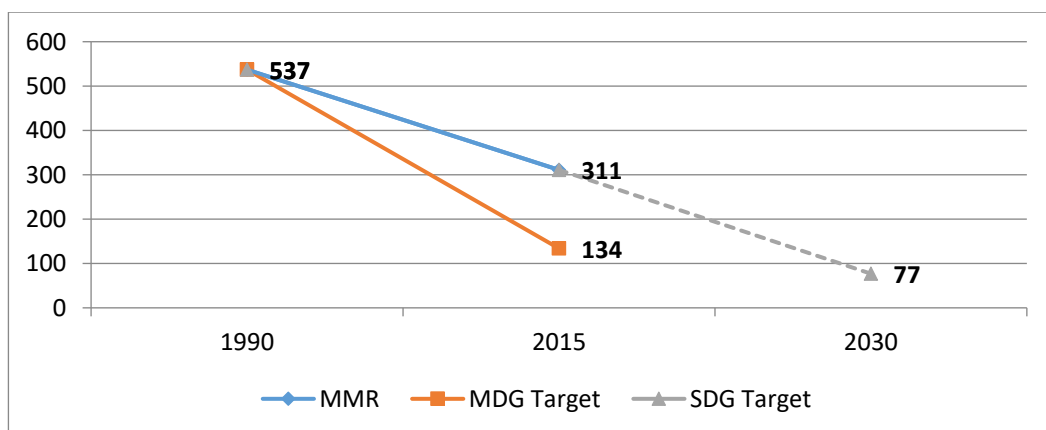
Key Health Indicator	
Human Development Index (HDI)	165th
per capita gross domestic product (GDP)	\$1,940 in 2014
annual economic growth rate	2.3 %
Population	40,782,742 million
Settled population	88% where 32.7% are urbanised
Nomadic population	8% of the (CBS, 2008)
Internally displaced	2.2 million
Refugees	2 million
Population growth rate	2.8%
Population age	mainly young with 45.6% below the age of 15 years (CBS, 2008)
Total Fertility rate	5.2
Average family size	5-6 persons
life expectancy	59 years
Crude birth rate	31.2
Crude death rate	16.7 Per 1000 people

Source: National Health Policy 2017-2030

2.2.4 Sudan's RMNCH Context

Although Sudan failed to reach its health-related millennium development goals (MDGs) targets, significant progress has been made. The maternal mortality rate declined by 42% between 1990- 2017, down to 311 per 100,000 from 537 per 100,000 live births, at an annual national reduction rate of 2.8% (FMoH, 2010d, 2014, 2017a, 2017b). By way of comparison, Ireland's MMR is 8 per 100,000 live births (FMoH, 2017c; WHO, 2015c). Similar to other LMICs, women in Sudan face a lifetime risk of maternal death of 1/180 (WHO, 2018b). Maternal deaths are mainly attributable to bleeding, septicaemia, pregnancy-induced hypertension, infections, and anaemia (FMoH, 2010d, 2014, 2017a, 2017b).

Maternal healthcare in Sudan has evolved from being primarily provided by traditional birth attendants, to the village midwife, and is currently being transitioned to the community midwife. Access for women to health services, especially maternal care, is greatly influenced by culture and socioeconomic status. Figure (2) below shows the maternal mortality rate of 537 per 100,000 in 1990 to a projected goal to reduce the maternal mortality rate to 77 per 100,000 by 2030, in line with global SDG targets (FMoH, 2010d, 2014, 2017a, 2017b). The shortage of maternal health providers in Sudan, and in particular, community midwives in 2013 stood at 14,000. Such a shortage has necessary implications for the health system, disrupting the quality of service delivery, and contributing to poor maternal health indicators.



Source: National Health Policy 2017-2030

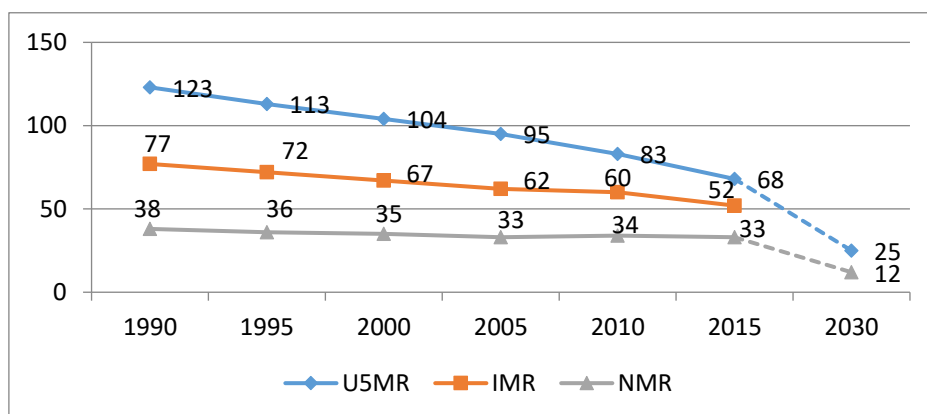
Figure 2 Maternal Mortality Ratio from 1990 projected to 2030

Table 4 Main Maternal Health Indicators

Main Maternal Health Indicators	
Proportion of women receiving antenatal care (at least one visit)	74.3%
Coverage by 4 visits	57%
Coverage by family planning	9%
Unmet need for family planning	29.0%
Deliveries attended by skilled birth attendants	80% (with 70% of deliveries taking place at home)
Prevalence of low birth weight	Urban 27.9% and rural areas 33%.

Source: National Health Policy 2017-2030

The under-5 mortality rate in 1990 was 128 per 1000 live births and declined to 72 deaths per 1000 live births in 2015, at an annual reduction rate of 2.9%, as shown in Figure (3) below. However, the neonatal mortality rate between 1990 and 2015 decreased by only five deaths per 1000, from 38 per 1,000 live births to 33 per 1,000 live births. The main causes of infant and under-5 mortality and morbidity are diarrhoea, malaria, pneumonia, and protein-energy malnutrition, the latter affecting 16.3% of children ([FMoH, 2010d](#), [2014](#), [2017b](#)).



Source: National Health Policy 2017-2030

Figure 3 Under 5 Mortality Rate from 1990, projected to 2030

2.2.5 Sudan's Geo-Political Context

Sudan was under British colonisation from 1885, gaining independence in 1956. Sudan has since gone through many periods of historical significance. The country experienced several internal conflicts, including the once described longest civil war in Africa, which culminated in the secession of the Southern part of the country in 2011. Moreover, internal conflicts in the Eastern and Western parts of the country have yet to be resolved by comprehensive peace agreements

([FMOH, 2017b](#)). Most recently, protests and demonstrations against growing economic hardship and poorly resourced and underfunded healthcare services demanded the President of Sudan resign, which ultimately resulted in the termination of the thirty-year-long regime (The, [L. 2019](#)).

In an attempt to achieve rural extension of the then-limited, predominantly urban-based, health services, Sudan launched its Primary Health care (PHC) approach in 1976 ([FMOH, 2008](#)). As part of a five-year social development plan, and leveraging the Alma Ata declaration in 1978, this initial PHC approach marked a clear vision towards universal, equitable health services. This was strongly supported by the government and involved all concerned sectors, NGOs, and the community and resulted in an unprecedented expansion of health services through newly established health facilities and the introduction of community health workers ([FMOH, 2008](#)).

Since then, Sudan has adopted several PHC principles, including community participation, inter-sectoral collaboration, integration, universal accessibility, equity, and social justice. Sudan's PHC approach was further enhanced by free services enshrined within national health policies, many of which have been implemented in various ways, subject to changes to the country's internal, political, professional, and administrative context ([FMOH, 2008](#)). Throughout the last decades, programme implementation has mostly been restricted to new interventions and programmatic approaches, as introduced by international donors and UN agencies, such as the WHO or UNICEF, and mainly in response to specific diseases, such as HIV/AIDS. As a result, the FMOH has been struggling with accommodating and harmonising diverse vertical programmes ([FMOH, 2008](#)). In addition to each of these programmes being primarily vertical (i.e., focused on a single disease or health-related topic), a holistic approach to health system strengthening has mainly been missing.

From 1975 until 1984, health services in Sudan continued to be provided free of charge, supported by tax-based funding and donors ([FMOH, 2008](#)). The latter proved to be very effective in generating monetary or in-kind contributions to health services. Communities also contributed to building numerous health facilities voluntarily ([FMOH, 2008](#)). In the mid-1980s, however, during a period characterised by instability, shrinkage of donor funds, and regression in political,

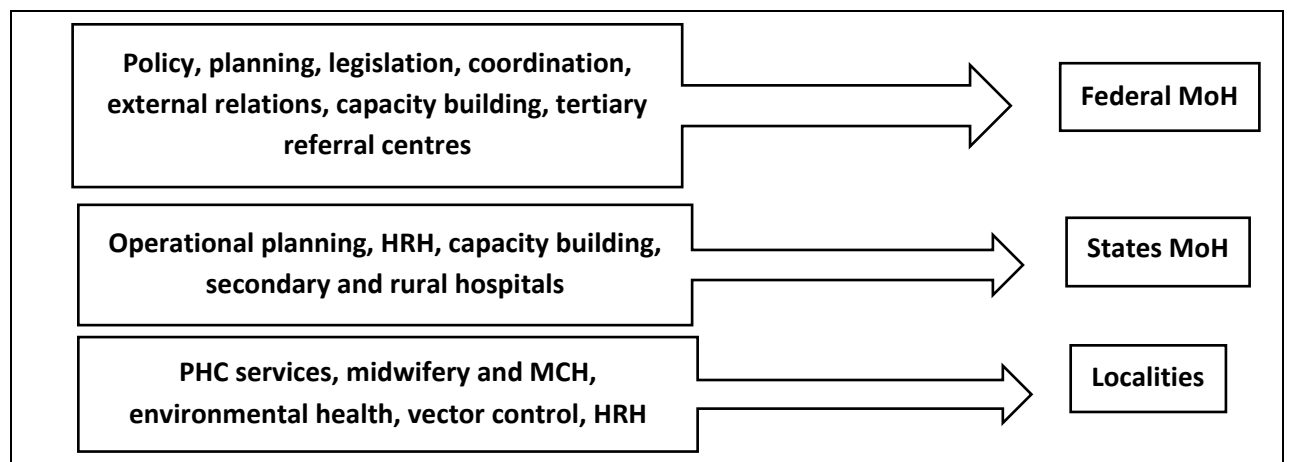
community, and professional commitment, services began to shrink and deteriorate in quality ([FMoH, 2008](#)). In 1987, the WHO and UNICEF proposed the Bamako Initiative, intending to enhance primary health care access by promoting the equity, efficiency, effectiveness, and financial viability of health services ([UNICEF, 1987](#)). In Sudan, the view was to revitalise district health systems through the establishment of community co-management and co-financing mechanisms, focusing on the availability of essential medicines. The country started implementing the Bamako Initiative in 1988, across several piloted districts ([FMoH, 2008](#)).

In 1989, the FMoH enacted the Health Area Policy, which was designed to strengthen the district health system to support community participation through decentralised and bottom-up planning ([FMoH, 2008](#)). Also, the WHO launched and Sudan adopted the Basic Development Needs (BDN) programme, designed to build community capacity to improve their living conditions and thus contribute to improvements in community health ([FMoH, 2008](#)). Unfortunately, these two interventions followed a programmatic piloting approach with limited coverage, minimal coordination with other programmes, and without real empowerment, for the communities to play a proactive role ([FMoH, 2008](#)). Consequently, both endeavours failed to meet their objectives. Around this same time, the International Monetary Fund (IMF) 's Structural Adjustment program (SAP) forced a reduction in government investment within the social sector, favouring instead cost-sharing and out-of-pocket payments, where charging a user fee was declared as a policy in 1990 ([FMoH, 2008](#)).

The war in the South also flared up, and donors lost interest in the country. An undeclared boycott of Sudanese goods and products also took place ([FMoH, 2008](#)). As is often the case in times of scarcity, planning for health shifted from long-term comprehensive planning to annual budgetary-based planning, with minimal resources allocated to areas of political instability ([FMoH, 2008](#)). Simultaneously, a series of interventions were introduced in the country based on the selective PHC approach. These mainly focused on maternal and child health (MCH) programmes, such as the growth monitoring, oral rehydration, breastfeeding, immunisation (GOBI) project, family planning, with their vertical nature mainly

supported by UNICEF ([FMoH, 2008](#)), and further exacerbated the fragmentation of efforts in management, finance, and service delivery.

Sudan's unique context, marked by civil conflict, natural disasters, displacement, administrative and political instability, has had significant implications for its health system. Today, the health system in Sudan is decentralised, across three levels of governance: federal, state, and locality, as shown in Figure (4) below. The Federal Ministry of Health (FMoH) is responsible for policymaking, strategic planning, and international relations, providing financial and technical support to the states, as well as monitoring and evaluating the country's overall health status. When it comes to RH services, care is provided at the three levels, with each level dictating the degree of intervention, specialisation and level of care provided as promotive, preventive, and curative. Provision of MCH services by senior specialists, medical officers, midlevel health cadres (Medical Assistants, Sister Midwives, Nurse Midwives, Health Visitors, Assistant Health Visitors), and community midwives are most limited in rural areas ([FMoH, 2012a, 2017b](#)).



Source: National Health Policy 2017-2030

Figure 4 Sudan Health system structure

Similar to many other countries in the region, Sudan was heavily influenced by global trends and initiatives aiming to strengthen health systems, with the focus shifting from whole systems in the 1970s, to a focus on interventions in the 1980s, health system reform that took a disease-specific focus from 1990s-2000s, and finally, to health system strengthening in the 2000s. National laws, policies, and strategies have largely been following global approaches ([FMoH, 2018](#)). A summary of the timeline against global shifts in health trends and policies is

provided in Table (5), highlighting the political direction and international agenda influences on the development of essential health system development policies in Sudan.

Table 5 RMNCH rules, regulations and laws

Timeline	Periods of Historical Significance in Sudan	Global trends in HSS	National Key Health Systems Development policies
1885-1956	Era of British colonial rule		Emergence of a formal health system
1956-1958	The independent era National government removed by military coup		Nationalism and its impact on the health systems development
1958-1985	President Numeiri's military rule		Creating national health systems after independence
1962-2005	Civil war starts in the South	1970s: whole system focus, comprehensive PHC, Alma Ata 1978	Implication of instability on the health systems
1986- 1989	Civilian government	1980s: focus on interventions > selective PHC, GOBI-FFF	Implication of instability on the health systems
1989-2016	President Elbahr's military rule		NHIS & recent policies and reforms (the impact of past policies) Decentralisation of the public structures and the cost-sharing financing mechanisms for health services
1991		1990s: health system reform – focus on overall financing and organisation (efficiency and equity)	Introduce user fee and no free Public Health Care
1994			Federal/ Decentralised health system
1995		mid-1990s–2000s: focus on priority diseases, e.g. HIV/AIDS > Global Fund plus	Establishment of the National Health Insurance Fund
1996			Emergency care free of charge -Presidential declaration
2000-2025		2000s: health system strengthening	25-year strategic plan
2001			The 'Sudan Declaration' for upgrading of nursing, midwifery and allied health professions
2005	Interim constitution		
2006-2010			National RH Policy
2007			Interim constitution states that Basic Health Care Free
2007			National Health Policy
2008			Free care for pregnant women and U5
2010			National Health Financing Policy
2010			National RH Policy 2010-2015
2016-2020			"10 in 5" Strategy: RMNCHA Strategic plan
2015			Family Health Policy
2016			Health in All Policy
2017-2030			National Health Policy
2019-Present	Transitional government		

2.2.6 RMNCH Policies

Before the Reproductive Health Strategy 2000-2005, not much attention had been directed towards midwifery, nor was it easy to get the financial support for the midwifery schools. Although it was never endorsed, this RH Strategy signalled the government's commitment to improving RH. In 2001, a Presidential decree called 'The Sudan Declaration for the upgrading of nursing, midwifery and allied health professions' was announced. The Declaration proposed to improve health through strengthening the health system by targeting the production of a larger health workforce, mainly through training additional nurses, midwives, and allied health professionals and upgrading their education from vocational to university level (FMoH, 2001).

Furthermore, Sudan signed the global initiative of Safe Motherhood in 1987 and "Making Pregnancy Safer" in 2001. In August 2001, the States' Ministers of Health, in the presence of the Federal Minister, signed the Sudan Declaration of Safe Motherhood that aimed at providing a village midwife (VMW) for each village in Sudan (FMoH, 2010c). Also, in the early 2000s, the FMoH initiated a reform of its human resources directorate (FMoH, 2012c, 2018). While the Reproductive Health Strategy 2000-2005 was never endorsed, the Strategy paved the way for an annual plan, stimulated discussion, and ultimately led to the development of the 2010 Reproductive Health Policy; a concise, influential policy document endorsed by the Federal Ministry of Health (FMoH, 2010b). Featuring midwifery as a critical component, the 2010 Reproductive Health Policy contained definite directions and recommendations to be taken forward, including human resource management reform measures that included a clear career structure, job description, task shifting. It ensured that 'each village has a trained midwife' (FMoH, 2010a).

In 2009, a midwifery strategy was developed in response to weak performance identified among existing VMWs, with technical assistance from the WHO. Long and short-term objectives identified throughout the Strategy and critical gaps, quick gains, and priority areas for action were determined. With this new strategic vision, midwife production, training, deployment, and issues advocated for. New cadres, including the technical midwife, the BSc Midwifery, and assistant health visitor programmes were also introduced (FMoH, 2012a, 2018).

In 2010, the 5-year Strategy entitled 'Road map for Reproductive Health 2010-2015' was set after global consultation. In addition to describing the RH landscape, it outlined critical gaps and a particular focus on progress towards Sudan meeting the MDGs. The road map represented a vital advocacy tool for maternal health issues and proved useful for mobilising resources, lobbying political buy-in, and fostering international collaboration to accelerate efforts towards reaching the MDGs (FMoH, 2010c).

The Maternal and Child Health Directorate of the Primary Health Care General Directorate at the Federal Ministry of Health developed the '10 in 5' Strategy (2016-2020). The strategy lists 'access and utilisation of services' and 'optimising the performance of the health workforce' among its top priorities, as did the aforementioned national health sector and HRH strategies. Performance measures identified as a means to assess the current status to scientifically and systematically optimise it. However, no performance measure was used nor existed within the federal and state ministries of health in Sudan. Therefore, necessitating the need to develop a practical measure of the RH HWF performance and, in particular, for the 14,000 CMW cadre, which was developed, produced and deployed to provide frontline RMNCH services, in hope to assist in improving the relevant RMNCH indicators to reach SDG 3.

Despite all efforts, the implementation of maternal, newborn and child health programmes in Sudan is confronted by many challenges, including: (i) unclear policies concerning practice regulation and inadequate financial resources, (ii) inadequately functioning health system, with weak referral systems, especially during obstetric and neonatal emergencies, (iii) suboptimal logistics system for management of drugs, family planning commodities and equipment, and (iv) lack of co-ordination amongst partners.

2.2.7 Evolution of Sudan's Health Workforce for RH

Formal medical and health professional education in Sudan started in the early 1900s with the training of nurses and medical assistants. The midwifery school in Omdurman was established in 1921 with the assistance of Sisters Wolfs from Britain (Bayoumi, 1979). Following that, the Kitchener medical school of medicine, later renamed the Faculty of Medicine-University of Khartoum, was opened in Khartoum in 1924 as the first medical school in tropical Africa ([Haseeb, 1967](#)). The

evolution in the cadres providing RMNCH care within the country is further detailed below, as depicted in Figure (5).

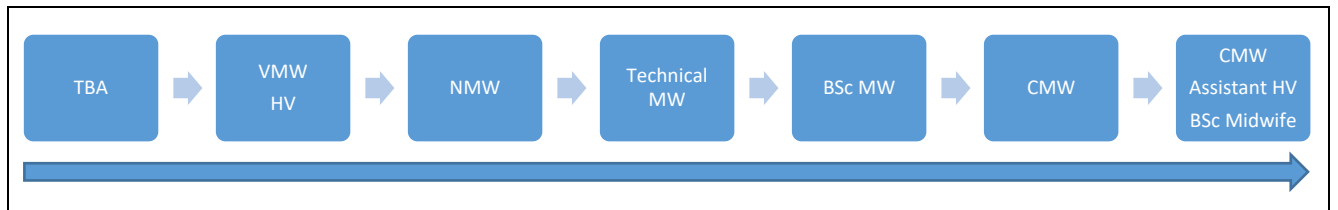


Figure 5 Evolution of RH cadres

Traditional Birth Attendants (TBA) refer to women in the village and communities who were historically responsible for women's care during pregnancy and labour. Historically, training of TBAs occurs between older TBAs and younger TBAs, and, in most cases, the role is passed down through maternal lineage. In this sense, TBAs receive no formal training and knowledge is handed down through the generations. While TBAs still provide maternal and child health services, their services are not nationally endorsed and are part of the formal health system, that said, TBAs are still considered a vital local resource to help manage the problem of poor maternal and reproductive health in the country, and they still constitute part of the midwifery workforce. Though generally no longer considered midwives, they remain part of the formal health system in some states, including the Red Sea state in East Sudan. Throughout the 1990s, the government invested heavily in TBAs, trying to improve their capacity by offering 3-6 months of training. Today, the FMoH intends to gradually phase out TBAs, by shifting investments from their training to other cadres, including the community midwife.

The **Health Visitor (HV)** operates at primary health care (PHC) level and is the most senior cadre providing maternal and child health care. Introduced in the 1940s, the HV is an exclusively female nurse-midwife who completes an additional two-year training in the health visitor school following years of service as a midwife. In total, a HV receives upwards of seven years of training, rendering her eligible to take on a supervisory role for other midwives. The HV trained on maternal health promotion, prevention, curative care, and management, teaching, and training skills. The HV works at the district or locality level, and her tasks differ according to the PHC facility's description of work and catchment area. Historically, HVs were

assigned a catchment area and were responsible for supporting, supervising, and monitoring the performance of the VMWs in the field and within the health centre. The HV provides antenatal care (ANC), postnatal care (PNC), family planning (FP) services, nutrition, and immunisation counselling in addition to providing technical support and supervision for the midwives.

The shortage of higher education institutions and universities led to a 'Revolution of Higher Education', a national policy providing more opportunities for higher education by opening universities throughout the country, starting from 1990 ([FMoH, 2008](#); [NHRHO, 2006](#)). The number of medical schools, the majority of which are located in Sudan's capital, Khartoum, reached a total of 10 in the 1990s, with fewer students graduating as allied health professions ([FMoH, 2018](#)). This steered the production of allied health professionals from vocational schools with professional certificates to university education with bachelors' in science degrees. In 2000, the country had around 19 medical schools, but only two functioning nursing schools ([FMoH, 2008](#)). A dwindling number of existing midwifery vocational schools further reflected the neglect of the production of allied health professionals. The skewed distribution of health education in favour of medical schools, over other allied health professions undoubtedly contributed to the large skill-mix imbalance that exists in Sudan today ([FMoH, 2001](#), [2012c](#), [2018](#)).

Historically, the **Village midwife** (VMW) was vocationally trained as a maternal health workforce cadre, for 9-11 months, and formed the bulk of the profession. The training programme under midwifery schools affiliated to the Federal and State Ministries of Health. The programme focuses on some health education and promotion activities in addition to labour and routine care of the neonate. VMWs were recruited from their villages and were predominantly older. There were significant variations in VMW literacy rates, which acted as a rate-limiting factor to the level of training they could receive. VMWs were licensed to practice within the community as frontline health workers but were never permitted to operate at a hospital level, nor were they permitted to prescribe medication. The village midwife programme stopped in 2013 and was replaced by the CMW programme as a national strategic direction to attain the SDGs. To ease this transition, a bridging programme has been developed for existing VMWs,

allowing them to 'upskill' to the level of a CMW, following a 3-6 months intensive training programme.

Despite the aforementioned national HWF and RH strategies and policies, the critical shortage and skill-mix imbalance of allied health professions were evident from the first nationwide HRH survey ([NHRHO, 2006](#)). In response to these HWF challenges, the Federal Ministry of Health's Human Resources Development Directorate (HRDD) established the Academy of Health Sciences (AHS) in 2005 to increase the production of the most needed allied health workers in all states of the country ([FMoH, 2012c](#)). The AHS is focused on the quality of education, reviewing curricula, improving training skills, and setting the international confederation of Midwives (ICM) principles concerning midwifery education ([FMoH, 2012c, 2018](#)). The AHS' commitment to midwifery was apparent from the beginning. Its establishment ensured that midwifery schools were affiliated to the institution, and it devised a clear road map for HRH within the field of RMNCH([FMoH, 2016](#)).

Today, the AHS oversees the midwifery profession, and together with the N&M and RH sub-directorates, took the lead in rebuilding the profession ([FMoH, 2012c, 2018](#)). Furthermore, it signalled a breakthrough in strategies for planning, training, and the production of fit-to-practice and fit-for-purpose RMNCH cadres ([FMoH, 2016](#)). Recruitment of candidates was set at the state level, with waivers for tuition fees introduced in the hope of retaining the health workforce and later employing them within their state. The AHS has since graduated thousands of nurses, midwives, technicians, and medical assistants through this programme ([FMoH, 2012c, 2018](#)).

The **BSc Midwifery** introduced in 2010 in national recognition of a need for role models within the field of midwifery. The vision was that graduates of the BSc would be capable of representing the profession, leading, advocating, and training future generations of midwives. Designed to replace the health visitors' role, the BSc in Midwifery developed as part of a consultative process between national and international stakeholders, including UN agencies such as the WHO, UNFPA, and UNICEF, as well as civil societies, including the midwifery association. The training programme runs for four years, whereby trainees undergo general nursing training for the first two years and then specialise in midwifery for the last

two years. Upon graduation, they are called midwives, as per the international confederation of midwives. The midwives are highly trained and usually positioned in hospitals in Obstetrics and Gynaecology (OBGYN) departments.

In 2013, Sudan's Maternal Death Review (MDR) system was evaluated by a national and international team. Out of this assessment came valuable findings and many recommendations towards strengthening the existing system to improving the quality of maternal health care. One of the most important recommendations was to institutionalise and upgrade the maternal death review (MDR) system to ensure adequate response and regular, sustainable reporting. This assessment coincided with the development of the National MNCH Acceleration Plan (2013-15), and strengthening of the MDR system became one of the acceleration plan strategies. Furthermore, MDR is embedded in Sudan's Commission on Information and Accountability (CoAI) framework.

Building on this initial platform, the FMOH launched a three year (2013 – 2016) PHC expansion project in 2012, adopting many of the universal health coverage (UHC) principles ([FMOH, 2015b](#)). The objective of this expansion project was to increase PHC coverage among the Sudanese population by increasing access to PHC facilities from 86% to 100% and increasing coverage with the minimum package of PHC services from 24% to 100% ([FMOH, 2015b](#)). By the end of 2016, 354 new PHC facilities had been established, and pre-service training provided for 7,758 community midwives, 1,367 medical assistants, and 1,805 community health workers ([FMOH, 2017b](#)). PHC facility coverage increased from 86% to 93%, with a minimum package from 24% to 60%. In February 2017, the government extended the expansion project until 2020.

The **Community Midwife** (CMW) created in 2013 as part of this PHC expansion programme. All 18 states currently have CMWs working at the level of the community. They are trained for 18 months, and unlike their predecessor, the VMWs, CMWs are required to meet minimum entry requirements, including a secondary school certificate. This initiative led to the recruitment of a new generation of younger female candidates. The CMW curricula incorporated many nursing skills that identified as lacking among VMWs and included primary health care (PHC) principles, health education, communication, midwifery science, ante/natal/postnatal care, and newborn care and resuscitation. As a result, the

percentage of villages covered by midwives has increased from 36% to 72% between 2011 and 2016 ([FMOH, 2017b](#)).

The expansion of training for CMWs has led to several challenges, including differences in the quality of training received across the various midwifery schools. Besides, the increased demand for competent instructors created a dearth of available trainers ([FMOH, 2015b](#)). Acting as the implementing arm of several strategies, including the Sudan Declaration and National HRH strategy 2012-2016, the AHS was instrumental in producing an additional 14,000 CMWs. To date, the AHS has trained midwifery and allied health professions midwives not only for Sudan's capital region (Khartoum) but for other states of the country, including the five Darfur states ([FMOH, 2018](#)). The production of another new cadre, namely the sister midwife, predominantly found in secondary and tertiary healthcare levels, was also a feature in midwifery development in Sudan. Trained as a nurse, followed by 14 months of midwifery training, sister midwives awarded a higher diploma ([Taha et al., 2013](#)).

Despite progress, the decentralised health system, scarcity of resources, and poor working environments continue to pose challenges for retaining health workers within hard-to-reach and rural areas. The capital and state cities continue to attract the majority of health workers, where they can train and work in facilities that are well-managed and equipped. Weak health worker deployment policies have left the health system with a shortage of health workers, despite an increase in HRH production rates ([AbuAgla, A. 2013](#)). Moreover, the presence of a private health sector offers opportunities for part-time jobs with better salaries and makes it difficult to retain a well-motivated, good-performing skilled health worker within the public sector. Finally, high turnover at leadership and middle-management levels, as well as inadequate financing and governance, creates a disabling environment. Taken together, all of these factors impact on the performance of health workers in Sudan.

2.2.8 Mapping Key HRH Partners and Stakeholders in Sudan

The primary health care providers in Sudan include the Ministry of Health (through the public health system) and the Ministry of Social Welfare (through the National Health Insurance Fund). The military and the police corps also provide health services. While these are the predominant stakeholders in terms of health

policy, planning, and health service delivery, the effective functioning of the health sector further relies on the active contribution of a range of additional stakeholders. In addition to public institutes and health facilities, health in conflict-affected states is provided by international organisations, international non-governmental organisations (INGOs), as well as national non-governmental organisations (NGOs) (FMoH-Sudan, 2012a). The private health sector in Sudan also experienced a significant expansion of health facilities and services following the 'investment encouragement act in 1992'. Table (6) offers an overview of the key health stakeholders in Sudan, their respective roles and responsibilities, including whether they employ health workers and their role in influencing decisions concerning the country's HRH ([FMoH, 2018](#)).

The first section defined the health workforce, highlighted their importance, reviewed previous MDG, and current SDG era milestones, challenges, and solutions with particular emphasis on RH in LMICs, mainly Africa. The importance of optimising HWF performance was set as a global priority. That followed by a comprehensive analysis of the geopolitical, socio-demographic, and economic system that shape, influence, and determine how the health workforce of Sudan operate in RH within the low-resource context. Furthermore, a better understanding of the historical health system developments, relevant RMNCH policies/strategies, and RH cadre evolution determined the global and national need to optimise HWF performance. However, the desk review returned a lack of available written documents and information on the development of the PHC Expansion programme. The mapping of the relevant stakeholders identified the need to measure performance, for which no national tool exists. Therefore, the following section reviews international literature definitions, theories, concepts, and constructs that measure performance.

Table 6 Summary of the roles and capacities of HRH stakeholders in Sudan

Stakeholder	Current role in HRH
Federal Ministry of Health (FMoH)	<ul style="list-style-type: none"> - HRH policy and planning - HRH mass training and funding - training paramedics - HRH management - HRH data and information
State ministries of Health (SMoH)	<ul style="list-style-type: none"> - HRH policy and planning at the State level and within the framework of National policy - HRH training (availability varies from State to State) - Training paramedics - HRH management down to the locality of staff, including the deployment of staff to locality health facilities - HRH data and information collection and storage
Ministry of Higher Education (MoHE)	<ul style="list-style-type: none"> - policies on production of HRH - licensing, monitoring and supervision of medical and health training institutions - teaching staff development and training - data and information on admissions, enrolment, graduates and staff
Ministry of Labour (MoL) Chamber of Civil Service (CCS) National Council For Training (NCT)	<ul style="list-style-type: none"> - employment and condition of service for health staff - salary structure and promotion of health workers - approval and funding of health workforce training
Ministry of Finance (MoF)	<ul style="list-style-type: none"> - provision of salaries for public sector staff - regulating the range of incentives for health staff - funding the allowances and incentive packages for staff placement
Sudan Medical Council (SMC)	<ul style="list-style-type: none"> - licensing and registration of physicians, dentists and pharmacists - accreditation of medical, dental and pharmacy schools - ensuring safety of practice by doctors and dealing with related public complaints
Council for Allied Health Professions (CAHP)	<ul style="list-style-type: none"> - licensing and registration of nurses, technicians and paramedical staff

Sudan Medical Specialisation Board (SMSB)	<ul style="list-style-type: none"> - postgraduate training for doctors, dentists, pharmacists and allied health professions - CPD for doctors
Army Medical Corps (AMC)	<ul style="list-style-type: none"> - employment of HRH on military terms - planning, distribution, management and training of affiliated staff
Police Health Services	<ul style="list-style-type: none"> - employment of HRH on Police forces terms - planning, distribution, management and training of affiliated staff - provision of basic medical and health cadre education
National Health Insurance Fund (NHIF)	<ul style="list-style-type: none"> - top-ups for health staff providing insurance services - employment and management of some staff categories
Sudan Doctors Union (SDU)	<ul style="list-style-type: none"> - Professional development for doctors (conferences, etc...) - support for doctors in condition of work and some general services
Sudan Health and Social Professions Trade Union (SHSPTU)	<ul style="list-style-type: none"> - condition of services and trade union activities for all health workers (with a focus on nursing and paramedics)
Sudanese Technicians Association (STA)	<ul style="list-style-type: none"> - professional development of technical staff - condition of work and scope of practice for technicians
Private sector	<ul style="list-style-type: none"> - production of HRH (basic and postgraduate training) - employment and management of staff - toppings for public sector staff working on part-time basis
International agencies and donors	<ul style="list-style-type: none"> - technical support in HRH policy and management - training and CPD chances - toppings for public sector staff

Source: National HRH Strategy 2012-2016

2.3 Health Workforce Performance

Broadly defined as the degree to which an individual helps the organisation reach its goals (J. P. Campbell, 1983), individual performance is considerably job-specific. An area of interest across many disciplines, including the fields of management, work psychology and health (J. Campbell, 1990) understanding how to maximise individual performance is of considerable academic interest, as it allows organisational goals to be realised (Popova & Sharpanskykh, 2010; Pransky, 2006). Whereas in the field of management, researchers focus on how to make employees as productive as possible, occupational health researchers are more often concerned with maintaining the productivity of employees (Beaton et al., 2009; Schultz, Chen & Edington, 2009).

However, how performance is measured is highly context-specific, differing from one job to another (Tubré, Arthur Jr & Bennett Jr, 2006). This is evidenced by a systematic review conducted by Koopman et al. (2011), which sought to identify individual work performance conceptual frameworks. They then went on to develop a heuristic framework based on their findings. The review found 486 different 'measures' of performance, with 17 generic and 18 job-specific conceptual frameworks. The lack of consensus around what constitutes individual performance means that much of the performance research is focused on predictors of performance rather than on defining the construct itself (J. Campbell, 1990). For example, there is a tendency for organisational work psychologists to focus on the influential determinants of work performance, by examining constructs such as productivity and satisfaction (Barrick, Mount & Judge, 2001; Halbeslebe, Wheeler & Buckley, 2008; Judge et al., 2001).

Similarly, within human resource management, scholars consider individual performance to be determined by staff availability, competency, responsiveness, and productivity within the wider system performance evaluation. Where assessment of the macro, micro and meso system levels the individual operates in is considered a prerequisite in accurately measuring individual performance and is part and parcel of the exercise (Dieleman & Harnmeijer, 2006). Several frameworks exist in assessing quality as the donobedian framework (Donabedian, 1980) and the universal health coverage monitoring framework assessing key

dimensions of effectiveness of treatment, patient safety, people-centredness and the level of integration of health services (WHO, 2015; Hanefeld et al, 2017) (see section 2.3.4).

The next section, therefore, explores how the disciplines of management, occupational health, and industrial work psychology define, conceptualise, and assess individual work performance. Principal theories developed across these disciplines are reviewed, compared, and contrasted, and the case is made for the need to develop a contextually relevant performance measurement for specific use with community midwives in Sudan.

2.3.1 Performance Definitions

Table (7) summarises various definitions of performance present within the literature. Despite the noted importance of job performance, it is only in the last two decades that scholars have attempted to clarify the concept of individual performance ([Sonnentag & Frese, 2002](#)). Among the more widely endorsed definitions of individual performance within the field of organisational and work psychology, is that of Campbell (1993), who describes the individual performance as “what the organisation hires one to do and do well” (p.40). Others, such as Viswesvaran and Ones (2000), define work performance as “scalable actions, behaviour, and outcomes that employees engage in or bring about that is linked with and contribute to organisational goals” (pp. 216-226), thereby placing more of an emphasis on the actions and behaviours of the individual to meet the expectations of the organisation.

Likewise, Boxall (2003) describes the performance as “a function of employee ability, motivation and opportunity to participate or contribute” (pp. 5-20). Bergeron (2007) defines performance as “Behaviours needed to help the organisation reach its goals” (pp. 1078-1095), as listed in Table (7) below. Finally, within the field of human resource management, a well-performing health workforce is defined as “one that works in ways that are responsive, fair and efficient to achieve the best health outcomes possible, given available resources and circumstances” ([WHO, 2006b](#), p 67).

Despite the existence of multiple definitions, several commonalities emerge that are considered central to the concept of performance. Namely,

performance is described by many scholars as something dynamic, behavioural, evaluative, episodic, and multidimensional (J. [Campbell, 1990](#); [Sonnentag, S. & Frese, M., 2002](#)). Firstly, dynamic refers to the fact that performance changes over time as a result of learning and time spent in a specific job (Avolio, Waldman & McDaniel, 1990; McDaniel, Schmidt & Hunter, 1988; [Quiñones, Ford & Teachout, 1995](#)). While at first, performance depends on declarative knowledge, or “knowing that something is the case, i.e., knowledge of facts, theories, events, and objects” (Gagné, Yekovich & Yekovich, 1993), it later shifts to what is termed as more procedural knowledge, or “knowing how to do something which includes motor skills, cognitive skills and cognitive strategies” (Kanfer & Ackerman, 1989; Gagné et al., 1993; P. L. [Ackerman, 1988](#)). Moreover, performance overtime shifts from controlled processing of work, to become more automatic (Kanfer & Ackerman, 1989; P. L. [Ackerman, 1988](#)). Therefore, performance is not static, and is susceptible to environmental factors present within the work context, necessitating the need to develop performance measures that accommodate its nature.

Second, performance is largely thought of as a behavioural construct. As such, it is thought to be objectively observable within a given context and can be evaluated positively or negatively for individuals or organisational goals (C. H. [Campbell et al., 1990](#); Carlos & [Rodrigues, 2016](#); Motowidlo, Walter & Mark, 1997). Motowidlo et al. (1997), define performance as a behaviour that is done while at work and can be evaluated. Put another way, performance, as a construct, is thought to be observable through one or multiple behaviours in the workplace. These behaviours can be measured, or directly observed, therefore rendering performance evaluative. Furthermore, performance is considered distinguishable on a scale of desirable or positive or negative behaviours as they pertain to the organisation ([Borman & Motowidlo, 1997](#)).

Thirdly, performance is episodic so that it may fluctuate for the day, and an individual, during the 8- hour working day, might perform in a way that neither hinders nor helps the organisation. Periods where performance aids the organisation are termed by some as ‘streams-of-work’ behaviour when they do (Carlos and [Rodrigues, 2016](#); [Motowidlo, 1997](#)). Finally, and given that multiple types of performance-related behaviours are considered observable, performance is considered multidimensional. The number of dimensions present

within the individual performance, however, varies significantly within the existent literature.

2.3.2 Performance Factors

Among the first scholars to define individual work performance were [J. Campbell \(1990\)](#) and K. Murphy (1989), both of whom divided performance into two sub-components: task and contextual performance. Scholars have differentiated between both task, and contextual performance based on three assumptions: (1) activities relevant to contextual performance is similar across jobs but differ in task performance; (2) therefore, contextual performance is extra-role behaviour while task performance is more in-role behaviour and pre-set (3) hence, contextual performance is related to personality and motivation while task performance is related to ability (Borman & Motowidlo, 1997; Sonnentag & Frese, 2002).

Task performance is defined as "the proficiency with which one performs a certain task" (JP. Campbell, 1990, p 114) and is therefore considered part of the 'technical core' either by technically processing, maintaining or servicing the organisation (Borman & Motowidlo, 1997; Carlos and Rodrigues, 2016). In contrast, contextual performance is defined as individual behaviours that support the social, psychological and organisational environment, but does not contribute to the technical core (Borman & Motowidlo, 1993; Koopmans et al., 2011; Sonnentag & Frese, 2002).

In addition to these two sub-components, Campbell further identified individual work performance as constituting eight factors: (1) job-specific task proficiency, (2) non-job-specific task proficiency, (3) written and oral communications, (4) supervision, (5) management and administration (6) demonstrating effort, (7) maintaining personal discipline, and (8) facilitating peer and team performance. He further emphasised that each of the generic domains encompass work-specific indicators that may vary across jobs (J. Campbell, 1990).

Murphy (1989), on the other hand, only described four factors: (1) task behaviours, (2) interpersonal behaviours (communicating and cooperating with others), (3) downtime behaviours (work-avoidance behaviours), and (4) destructive/hazardous behaviours. While both scholars include both task and contextual performance factors, Murphy further includes counterproductive

behaviour in the factors of work avoidance and destructive behaviours (K. Murphy, 1989).

Similarly, Borman and Motowidlo (1993) also identified performance constructs to fall within the greater task and contextual dimensions. They later reviewed these dimensions by adding new aspects. One being organisational citizenship behaviour, defined as 'individual behaviour that contributes to the maintenance and enhancement of the social and psychological context that supports task performance' (Organ, 1988), and the other is the counterproductive behaviours, defined as 'a behaviour(s) that harms the well-being of the organisation' (Koopmans et al., 2011; Rotundo & Sackett, 2002; Viswesvaran & Ones, 2000). These dimensions, and the factors they relate to, are described in greater detail below.

As pointed out by Koopmans and colleagues (2011), the concept of organisational citizenship behaviour seems to overlap with contextual performance heavily. Koopmans et al., (2011) therefore grouped the 486 different measures of performance yielded by their systematic review into four dimensions: task performance, contextual performance, adaptive performance, defined as the extent to which an individual adapts to change in a working system or work roles (Griffin, Neal & Parker, 2007), and counterproductive work behaviour dimensions (Koopmans et al., 2011).

Other scholars, such as Viswesvaran (1993) identified individual work performance to be constructed of 10 factors: (1) productivity, (2) quality of work, (3) job knowledge, (4) communication competency, (5) effort, (6) leadership, (7) administrative competency, (8) interpersonal competency, and (9) compliance with/(10) acceptance of authority. Like Murphy, Viswesvaran considered counterproductive behaviour a key component of performance, in addition to contextual and task performance. This contrasts with Campbell, Borman, and Motowidlo, who consider the following two factors as the critical dimensions of performance. Table (7) provides a concise summary, analysis, and synthesise of the different performance definitions and factors discussed.

Table 7 Job performance definitions and factors

Authors	Definition	Performance factors
Campbell et al. (C. H. Campbell, Ford, P., Rumsey, M. G., Pulakos, E. D., Borman, W. C., Felker, D. B., et al. , 1990)	The total population of behaviours and activities that are considered important to accomplish organisational goals. Each of the activities performed at work may require different knowledge and skills, which may be functions of different abilities	(1) job-specific task proficiency, (2) non-job-specific task proficiency, (3) written and oral communications, (5) supervision, (6) management and administration (7) demonstrating effort, (8) maintaining personal discipline, and (9) facilitating peer and team performance
Borman and Motowidlo (Borman, & Motowidlo, , 1997)	There are two types of job performance: task and contextual	Contextual performance (1) Persisting with enthusiasm and extra effort as necessary to complete own task activities successfully (2) Volunteering to carry out task activities that are not formally part of own job (3) Helping and cooperating with others (4) Following organisational rules and procedures (5) Endorsing, supporting, and defending organisational objectives
Motowidlo et al., 1997)	The aggregated value to the organisation of the discrete behavioural episodes that an individual performs over a standard period. There are two types of job performance: task and contextual activities. Behaviour is what people do at work. Performance is behaviour with an evaluative component, that is, behaviour that can be evaluated as positive or negative for the individual or for the organisation	(1) task knowledge (2) task habits (3) task skills (4) contextual knowledge (5) contextual skills (6) contextual habits

Viswesvaran & Ones , 2000)	Performance consists of evaluable behaviours. There are several manifestations of individual job performance with the actual operational measures varying across contexts. In this sense, the explanation of the construct involves identifying the dimensions it is composed of	(1) productivity, (2) quality of work, (3) job knowledge, (4) communication competency, (5) effort, (6) leadership, (7) administrative competency, (8) interpersonal competency, and (9) compliance with/(10) acceptance of authority
Bergeron (Bergeron, 2007)	Behaviours needed to help the organisation reach its goals	Task performance and Organisational citizenship behaviour (OCB)

Source: adapted from (Carlos & Rodrigues, 2016)

2.3.2.1 Task Performance

Task performance contributes to the organisation's technical core and is therefore job-specific. Task performance is well-defined and is a common component in most individual performance frameworks (Koopmans et al., 2011), with ability and skills seen as key determinants of task performance (Sonnetag & Frese, 2002). Motowildo and colleagues further categorise task performance into two types. First, activities that transform raw materials into goods and services for the organisation, such as performing a surgery in a hospital or teaching in a school (Stephan J. Motowildo et al., 1997). Second, activities that service and maintain the technical core, such as planning, supervising or coordinating, all of which enable the organisation to work efficiently and effectively (Stephan J. Motowildo et al., 1997).

Across various frameworks, task performance is captured by Campbell's (1990) job-specific and non-job-specific task proficiency factors, by Murphy's (1989) task behaviour factor, and by Viswesvaran's (1993) productivity, quality of work and job knowledge factors. While Engelbrecht and Fischer (1995) consider action orientation, task structuring, probing, synthesis and judgment as factors of task performance, Mael et al. (2010) consider providing clinical services and clinical support as other variants of task performance. Table (8) extracts the factors from Table (8) that are considered to fall under task performance across the different frameworks.

Table 8 Task performance factors

Authors	Task Performance factors
Campbell et al. (C. H. Campbell, Ford, P., Rumsey, M. G., Pulakos, E. D., Borman, W. C., Felker, D. B., et al. , 1990)	(1) job-specific task proficiency, (2) non-job-specific task proficiency
Borman and Motowidlo(Borman, & Motowidlo, , 1997)	Task performance factors
Motowidlo et al. (Stephan J. Motowidlo 1997)	(1) task knowledge (2) task habits (3) task skills
Viswesvaran (Viswesvaran C, 2000)	(1) productivity, (2) quality of work, (3) job knowledge
Bergeron (Bergeron, 2007)	(1) Task performance and (2) Organisational citizenship behaviour (OCB)

2.3.2.2 Contextual Performance

In contrast to task performance factors, contextual performance describes individual behaviours such as altruism, consciousness, civic virtue, courtesy, sportsmanship, organisational spontaneity and professional organisational behaviour (Borman & Motowidlo, 1993; Koopmans et al., 2011; Sonnentag & Frese, 2002). It is considered an extra-role, related to motivation and personality (Sonnentag & Frese, 2002). Table (9) extracts those factors from Table (8) that are considered as contextual performance factors across different performance frameworks.

Table 9 Contextual performance factors

Authors	Contextual Performance factors
Campbell et al. (C. H. Campbell, Ford, P., Rumsey, M. G., Pulakos, E. D., Borman, W. C., Felker, D. B., et al. , 1990)	(1) written and oral communications, (2) supervision, (3) management and administration (4) demonstrating effort, (5) maintaining personal discipline, and (6) facilitating peer and team performance
Borman and Motowidlo(Borman, & Motowidlo, , 1997)	(1) Persisting with enthusiasm and extra effort as necessary to complete own task activities successfully (2) Volunteering to carry out task activities that are not formally part of own job (3) Helping and cooperating with others (4) Following organisational rules and procedures (5)Endorsing, supporting, and defending organisational objectives
Motowidlo et al. (Stephan J. Motowidlo 1997)	(1) contextual knowledge (2) contextual skills (3) contextual habits

Viswesvaran (Viswesvaran C, 2000)	(1) communication competency, (2) effort, (3) leadership, (4) administrative competency, (5) interpersonal competency, and (6) compliance with/(7) acceptance of authority
Bergeron (Bergeron, 2007)	Organisational citizenship behaviour (OCB)

Common dimensions identified under contextual performance include discipline, effort, interpersonal competency, helping, and developing others (Koopmans et al., 2011). Both Campbell and Viswesvaran's performance models identified six dimensions as contextual (Campbell JP, 1990; C. Viswesvaran, 1993), including the four shared dimensions of communication (written and oral communication), leadership (supervision and leadership), administrative (management and administration), and effort. They differ, however, in that Campbell's (1990) dimensions include maintaining personal discipline and facilitating peer and team performance, whereas Viswesvaran (1993) includes interpersonal competencies and compliance with acceptance of authority. According to Motowildo et al. (1997), contextual performance is predicted by habits and skills, mediated by contextual knowledge, and influenced by cognitive ability.

2.3.2.3 Adaptive Performance

Scholars, such as Allworth and Hesketh (1999), Griffin et al., (2007), Pulakos et al., (2000) and Sinclair and Tucker (2006) proposed adaptive performance to be a separate domain of individual performance, to account for the interchangeable nature of work systems and how they affect individual performance. Adaptive performance considers the ability of an individual to adjust to different cultures and environments, innovative problem solving, managing unexpected work conditions, learning new duties and techniques as key components of performance (Koopmans et al., 2011).

2.3.2.4 Counter-productive Behaviour

A focus on counter-productive behaviour has increased in recent years, with more new generic performance frameworks presenting one or more dimensions of counter-productive behaviour as shown in Table (10) below. For example, Hunt (1996) identified off-task behaviour, theft, drug misuse, and unruliness as observable counter-productive behaviours. While Murphy (1989) identified destructive/hazardous behaviour and downtime behaviours as counter-

productive behaviours, others, such as Rotundo and Sackett (2002) and Viswesvaran and Ones (2000), recommend that counter-productive behaviour be included as a third dimension, in addition to task and contextual performance.

Other behaviours considered as harmful to the organisation include absenteeism (absent from work) and presentism (attending work while ill), both of which have been researched in occupational health by scholars Escorpizo (2008), Allen (2008) and Burton et al., (2004). Allen (2008) further specifies that absenteeism and presentism are determined by health, work-life balance, personal life impact, stress, financial concerns, and job, employee, and company characteristics.

Table 10 Counter-productive factors

Author	Counter-productive factors
(K. Murphy, 1989)	(1) Downtime behaviours (2) Destructive/hazardous behaviours
(Hunt, 1996)	(1) Off-task behaviour (2) Unruliness (3) Theft (4) Drug misuse
(Rotundo M, 2002; Sinclair, 2006; O. Viswesvaran, 2000)	Counterproductive behaviour
(Allen, 2008; Burton, 2004; Escorpizo, 2008)	(1) Absenteeism (2) Presenteeism

2.3.3 Determinants of Performance

In both describing and measuring performance, scholars have tended to refer to performance in terms of both its determinants as well as its outcomes. Industrial organisational psychologists tend to study performance through three different, but overlapping perspectives (i) individual differences, which examines individual characteristics such as ability, personality, and motivation, (ii) situational focuses, or enablers and disablers of performance and (iii) performance regulation that defines the performance process itself (Sonnetag & Frese, 2002).

2.3.3.1 Individual Difference Perspective

Within the individual difference perspective, scholars consider performance by examining the individual differences in abilities, personality, and motivation (Sonnetag & Frese, 2002). Most of these theories, including cognitive or process theories, are predicated on the idea that individuals make rational decisions in their work, whereby desirable outcomes are associated with job efforts

(Dolea, 2005; RL Hughes, 2002; Zurn, Dolea & Stilwell, 2005). Similarly, goal setting theory states that an individual's behaviour guides the goals they wish to achieve, based on rational decisions (Dolea, 2005; Hellriegel & Slocum Jr, 2007). The model of goal setting includes the challenge (goal difficulty, clarity, and self-efficacy), the mediators (challenge and performance), moderators (task complexity, feedback, and ability, goal commitment), performance, rewards, satisfaction, and consequences (Miner, 2005).

Expectancy Theory assumes that an individual will work hard to perceive a higher value of the outcome, based on his or her motivation (Dolea, 2005). The decision-making process is explained by the ProMES theory, which postulates that a direct relationship exists between an individual's performance, the produced service, the evaluation and reward they receive, and their personal needs (RL Hughes, 2002).

Research in the performance area commonly identifies motivation, job satisfaction, and personality as prominent predictors or determinants of performance. According to J. Campbell (1990), predictors of individual performance include (i) declarative and (ii) procedural knowledge, skills, and (iii) motivation, whereby declarative and procedural knowledge and skills are predicted by a person's ability, personality, interests, education, training experience and aptitude-treatment interaction. Similarly, Motowildo and colleagues (1997) also emphasised the importance of task knowledge and skills as essential determinants of performance. However, they also considered the relationship between these determinants and performance to be mediated by habits and affected by personality. Personality affects contextual knowledge, skills, and habits, in addition to task habits, which, in turn, predict contextual performance. While task knowledge, skills, and habits predict task performance (Sonnentag & Frese, 2002; Stephan J. Motowildo 1997).

2.3.3.1.1 The role of Motivation and Job Satisfaction in Performance

Campbell (1990) describes motivation as a choice to perform with a certain level and persistence of effort. Similarly, Franco (2002) defines motivation as "the willingness to exert and maintain an effort towards organisational goals" (p.1255). The identification of employees' motivational levels and contextual factors that directly influence performance are recognised as of utmost importance to

managers to enhance the organisation's overall performance. Motivation acts like "an inner force in each of us that drives us towards the determined goal" (Özlen, 2013).

Theories of work motivation can be further categorised into content and process theories. The content theories include Herzberg's Two-factor Theory (Dolea, 2005; Zurn & Stilwell, 2005); and the Need for Achievement Theory (Hellriegel & Slocum Jr., 2011). Herzberg's Two-factor theory differentiates between satisfiers/ motivators and job dissatisfiers/hygiene factors, which influence the individual's work activity performance (Dolea, 2005; Zurn & Stilwell, 2005). While the intrinsic motivator factors determine work satisfaction in activities (Miner, 2005), the extrinsic or hygiene factors do not produce satisfaction but prevent dissatisfaction. This category thus factors in the working conditions, salary, job security, technical supervision, company policy, and interpersonal relations (Robbins, 2002). Thus, Herzberg recognises the intrinsic motivation factors as the work itself, responsibility, recognition, autonomy, and promotion.

The Need for Achievement Theory, states that individuals have three culturally-bounded needs for (i) power (ii) affiliation and; (iii) achievement (Hellriegel & Slocum Jr, 2011). According to Hellriegel & Slocum Jr, (2011), individuals are motivated to perform in excellence or succeed in the competition according to the individual's strength of desire to influence others, maintain close relationships with others, or their behaviour towards competition. Similarly, motivational skills refer to self-regulated strategies pursued during goal-striving (Kuhl, 1985; Franco, Bennett & Kanfer, 2002; Sonnentag & Frese, 2002). Motivational skills are considered more domain-specific and are influenced by situational factors, learning, and training experiences (Kuhl, 1985; Kanfer & Heggstad, 1997; Sonnentag & Frese, 2002). Motivational skills include emotional control, motivation control, and self-efficacy, where self-efficacy is related to both task and contextual performance and is defined as the belief that one can execute an action well (Baum, 2001).

Hoppock (1935) defined job satisfaction as a blend of psychological, environmental, and physiological conditions that allow the individual to feel content with their job. On the other hand, Vroom (1964) defines job satisfaction as the effective orientation of the individual regarding their task and schedules. While

the first definition emphasises the individual's feelings, the latter definition places the emphasis on the employee's role in the workplace (Inuwa, 2016). Other scholars, such as Spector (1997), Kaliski (2007), and George and Jones (2012), further perceive job satisfaction as an individual feeling and beliefs of accomplishments towards one's job. Thus, the more satisfied an individual is at work, the more likely he/she is to support work colleagues, enhance the work environment and contribute to the motivation and satisfaction of others (RL Hughes 2002).

Job satisfaction, as described by Rue and Byars (2003), is mainly determined by workplace factors, which include working conditions, financial packages, advancement, and opportunities. Furthermore, some studies emphasise the positive correlation between job satisfaction and performance (Inuwa, 2016; Kaliski, 2007), as identified in Al-Ahmadi's (2009) study among nurses in Saudi Arabia, and Raza and colleagues' study (2011) among public service officials in Malaysia (Al-Ahmadi, 2009; Raza, 2015). In these studies, the perceived feeling of job satisfaction and accomplishment is directly related to performance (Kaliski, 2007). Theories of job satisfaction assume that individuals react emotionally to their environment, whereby positive reactions signal more job satisfaction than those who exhibit more negative reactions (Dieleman & Harnmeijer, 2006). In accordance, a satisfied employee is a pleasant and active one (Aziri, 2011).

Equity Theory explains that satisfaction is related to the perception of being fairly treated by others, including colleagues in the same or different organisation (Adams, 1963), whereby staff job satisfaction is considered to be more likely when staff feels treated relatively within the organisation (Al-Zu'bi, 2010). Moreover, Squires et al. (2015) argued, that if feeling dissatisfied individuals may not quit their jobs, but dissatisfaction may consequently impact on their quality of performance as well as that of their colleagues by displaying hostility in the workplace.

2.3.3.2 Situational Perspective

In contrast to the individual differences perspective, the situational performance perspective focuses on motivational and work-place factors that either support or hinder performance (Sonnentag & Frese, 2002). Specifically, situational approach theories explain how a change in the work situation affects individual motivation (Dieleman & Harnmeijer, 2006). Two approaches often

describe situational perspective: (i) the 'job characteristic model' and the (ii) 'operant approach'.

The characteristic job model adopts a more motivational approach to job performance. Richard & Oldham (1976), for example, postulates that skill variety, task identity, task significance, autonomy, and feedback all affect the critical psychological states of experienced meaningfulness, experienced responsibility for work outcomes, and knowledge of the result of work activities. This, in turn, is thought to affect job performance, work, and personal outcomes. The operant approach, on the other hand, is based on a system of rewards and punishment (RL Hughes 2002). Expectancy Theory, for example, aims to improve performance through reward systems or to establish fairness and equity perceptions (Sonnentag & Frese, 2002), where the higher the perceived outcome of value, the harder the individual works (RL Hughes 2002).

Other theories that adopt a situational perspective include Socio-technical Systems Theory and Role Theory. Socio-Technical Systems Theory assumes that work systems are composed of social and technical subsystems, whereby improving performance results from the optimisation of both subsystems (Trist & Bamforth, 1951). The theory suggests several job design principles, methods, task specification, and allocation with close control of problems and unforeseen events that could arise in the process (Cherns, 1976; Clegg, 2000; Sonnentag & Frese, 2002). Role Theory further identifies several work-place factors that hinder performance, including role ambiguity and role conflict (Kahn et al., 1964).

2.3.3.3 Performance regulation perspective

Finally, the performance regulation perspective includes theories that focus on the process of the performance itself and conceptualises performance as an active process. Cognitive psychology (Ericsson & Lehmann, 1996) and Action Theory (S. Frese, 2000; Z. Frese, 1994) are conventional approaches within this perspective. Within work and organisational psychology, the performance regulation perspective includes research on expertise and excellence, which assumes that the difference between high and moderate performers rests in how they approach their task(s) and how they come to reach solutions (Sonnentag, 2000). Findings within this field suggest that high performers apply a 'relational strategy,' combining and integrating task aspects and solution processes to

understand a problem with a focus on abstract and general information (Isenberg, 1986; Vessey, 1998). High performers also plan better in complex and disorganised tasks, concentrating on long term goals as opposed to well-defined ones (S. Frese, 2000; Sonnentag & Frese, 2002).

Action Theory defines performance as any action from both a process and a fundamental point of view. Whereas the process concentrates on sequential parts of the action, including goal development, planning, and execution of the action, monitoring, and feedback, the fundamental point of view refers to the organisational hierarchy (Z. Frese, 1994). Roe (1999) describes performance regulation as five perspectives: action theory as the first perspective and energetic, emotional, vitality, and self-image regulation perspectives.

Behaviour modification, as an approach to performance regulation, is built on Reinforcement Theory, whereby individuals learn behaviour from their consequences in a positive or negative reinforcement manner (Hellriegel & Slocum Jr, 2011). Moreover, behaviour modification is interested in the regulation of interventions from outside the individual, rather than within. For example, financial and non-financial interventions, positive feedback, and social rewards that constitute positive reinforcement (Kreitner, 1975; Sonnentag & Frese, 2002).

When explaining performance, however, many scholars tend to combine individual differences and situational perspectives. The job characteristic model, for example, incorporates both individual differences and situational perspectives. Similarly, Waldman's (1994) proposed Model of Performance states that job performance is affected by both personal factors (i.e., individual differences) and systems factor (i.e., situational variables). He further specifies that systems factors moderate the effects of person factors on performance (Waldman, 1994).

Mitchell's (1997) Model of Job Performance, assumes that motivated behaviour is directly affected by individual inputs (i.e., individual differences and job context, situational variables) via the arousal, attention, direction, intensity, and persistence of the motivational process. Suggestions of a comprehensive Performance Model by Sonnentag and Frese (2000) further specifies how cognitive ability and motivational factors, interacting with situational variables, translate to performance process as key to understanding performance.

Within human resources for health, Dieleman & Harnmeijer's (2006) framework for analysing health worker performance, further considers the determinants of the health workers' behaviour as influenced by policy-makers and different HRH stakeholders that allocate resources, develop plans, set regulatory frameworks and accountability mechanisms. Social rewards, financial and non-financial systems relate to factors outside the individual but still influence his/her performance. This is aligned with the performance regulation of behaviour modification theory (Kreitner, 1975; Sonnentag & Frese, 2002). At a micro level, or health facility level, Dieleman et al., consider health worker behaviour as influenced by local managers, partners, colleagues or patients that affect human resource management activities, availability of equipment, drugs, and supplies. This is similar to the situational perspective highlighted by various scholars (Sonnentag & Frese, 2002). Finally, at an individual level, Dieleman & Harnmeijer (2006) recognise specific individual factors including gender, or professional status (i.e., years out of training), and living conditions (i.e., working in conflict-affected states), that also affect performance.

Similarly, within human resource management, international organisations, such as the World Health Organisation (WHO), describe worker performance as determined and influenced by interventions at three levels:

job-related interventions, support-system related interventions, and interventions that create an enabling environment (WHO, 2006). This mirrors Waldman's proposed model of performance, which considers similar aspects (Waldman, 1994). Rowe et al. (2006) regard health worker performance as determined by (1) Health worker characteristics (individual level); (2) Health system and facility characteristics (macro and micro levels), (3) Contextual factors: Characteristics of the broader political and socio-economic environment and (4) community/population characteristics (Rowe et al., 2005; Hongoro & Normand, 2006).

Overall, prominent performance theories seem to agree that several individual, situational and performance factors determine the level of performance and are therefore useful in conceptualising and measuring the phenomenon. Moreover, extant theories seem to agree that the nature of performance is dynamic, behavioural, episodic, evaluative, and multidimensional.

2.3.4 Performance Measures

While Finally, the performance regulation perspective includes theories that focus on the process of the performance itself and conceptualises performance as an active process. Cognitive psychology (Ericsson & Lehmann, 1996) and Action Theory (S. Frese, 2000; Z. Frese, 1994) are conventional approaches within this perspective. Within work and organisational psychology, the performance regulation perspective includes research on expertise and excellence, which assumes that the difference between high and moderate performers rests in how they approach their task(s) and how they come to reach solutions (S. Sonnentag, 2000). Findings within this field suggest that high performers apply a 'relational strategy,' combining and integrating task aspects and solution processes to understand a problem with a focus on abstract and general information (Isenberg, 1986; Vessey, 1998). High performers also plan better in complex and disorganised tasks, concentrating on long term goals as opposed to well-defined ones (S. Frese, 2000; Sonnentag & Frese, 2002).

Action Theory defines performance as any action from both a process and a fundamental point of view. Whereas the process concentrates on sequential parts of the action, including goal development, planning, and execution of the action, monitoring, and feedback, the fundamental point of view refers to the organisational hierarchy (Z. Frese, 1994). Roe (1999) describes performance regulation as five perspectives: action theory as the first perspective and energetic, emotional, vitality, and self-image regulation perspectives.

Behaviour modification, as an approach to performance regulation, is built on Reinforcement Theory, whereby individuals learn behaviour from their consequences in a positive or negative reinforcement manner (Hellriegel & Slocum Jr, 2011). Moreover, behaviour modification is interested in the regulation of interventions from outside the individual, rather than within. For example, financial and non-financial interventions, positive feedback, and social rewards that constitute positive reinforcement (Kreitner, 1975; Sonnentag & Frese, 2002).

When explaining performance, however, many scholars tend to combine individual differences and situational perspectives. The job characteristic model, for example, incorporates both individual differences and situational perspectives. Similarly, Waldman's (1994) proposed Model of Performance states that job

performance is affected by both personal factors (i.e., individual differences) and systems factor (i.e., situational variables). He further specifies that systems factors moderate the effects of person factors on performance (Waldman, 1994).

Mitchell's (1997) Model of Job Performance, assumes that motivated behaviour is directly affected by individual inputs (i.e., individual differences and job context, situational variables) via the arousal, attention, direction, intensity, and persistence of the motivational process (Mitchell, 1997). Suggestions of a comprehensive Performance Model by Sonnentag and Frese (2000) further specifies how cognitive ability and motivational factors, interacting with situational variables, translate to performance process as key to understanding performance (Sonnentag & Frese, 2002).

Within human resources for health, Dieleman & Harnmeijer's (2006) framework for analysing health worker performance, further considers the determinants of the health workers' behaviour as influenced by policy-makers and different HRH stakeholders that allocate resources, develop plans, set regulatory frameworks and accountability mechanisms. Social rewards, financial and non-financial systems relate to factors outside the individual but still influence his/her performance. This is aligned with the performance regulation of behaviour modification theory (Kreitner, 1975; Sonnentag & Frese, 2002). At a micro level, or health facility level, Dieleman & Harnmeijer, consider health worker behaviour as influenced by local managers, partners, colleagues or patients that affect human resource management activities, availability of equipment, drugs, and supplies. This is similar to the situational perspective highlighted by various scholars (Sonnentag & Frese, 2002). Finally, at an individual level, Dieleman & Harnmeijer (2006) recognise specific individual factors including gender, or professional status (i.e., years out of training), and living conditions (i.e., working in conflict-affected states), that also affect performance.

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Table 11 Indicators for health workers' performance

Factors	Examples of indicators
Impact	
Health status	Decline in mortality/morbidity among targeted patients: Decreased prevalence and incidence
Effects	
Performance	Improved service delivery: Client satisfaction Re-admission rates and cross-infections Case fatality rates Treatment success rates, defaulter rates Coverage Service utilisation
Outcomes	
Availability	Waiting time, staff ratios, overtime, staff turnover, attendance of health workers
Productivity	Occupancy rate, outpatient visits and interventions provided per worker or facility Patient contacts
Competencies	Prescribing practices Adherence to protocol during diagnosis and communication with patients
Responsiveness	Proactive quality service, e.g. decubitus ulcers
Outputs	
Retention	Vacancies, posts filled, duration in job
Absence	Attendance of health workers, overtime
Being responsible	Showing initiative, active participation in audits and meetings Adherence to rules and Standard Operating Procedures
Skills and knowledge	Level of skills and knowledge of practices
Motivation and job satisfaction	Level of job satisfaction Level of staff motivation

Working conditions	Availability of infrastructure, medications, supplies Being aware of and adhering to communication and decision-making procedures: Number of meetings held with minutes and action list Confidential procedure for complaints in place and used Management support offered: Amount of supportive supervision
--------------------	---

Source: (Marjolein Dieleman, 2009)

It is important to note that most performance theories, scales, and tools are developed in the North and exported to the Global South (Borman & Motowidlo, 1997; J. Campbell, 1990; K. Murphy, 1989; C. Viswesvaran, 1993). The assumption being that these same performance definitions, domains, and factors are also relevant and applicable to health workers in the global south, despite these health workers often operating as different cadres, in entirely different contexts, with different modalities, resources, and administration.

Overall, the above literature evidence that there is no universal agreement on what constitutes performance, nor is there agreement on what defines a well-performing health worker. What scholars appear to agree on, however, is that performance is complex and can be observed through behaviour, multi-factorial or multidimensional, and influenced by several individuals and broader, system-level, determinants. Moreover, there appears to be a general agreement that performance measures should consider how performance is defined within a specific role and that chosen performance indicators should be indicative of the tasks and responsibilities assigned to this role. Therefore, given the gap in the literature, a systematic literature review carried out to determine what factor(s) constitute 'performance' of maternal health workers in low and middle-income countries (LMICs) in the achievement of the first research objective.

Finally, health worker performance definitions, models, domains, factors, and determinants are largely based on theories imported from the global North. Therefore, any performance measure development needs to incorporate an in-depth, contextual understanding of local definitions, perceptions, and understandings of the construct(s) to be measured. Therefore, in assessing the performance of community midwives in Sudan, there is a need to engage in an in-depth, highly consultative process to determine what factors comprise performance for this cadre, in this context, and what indicators are best placed to measure the same.

3 Chapter Three Methods

Introduction

This chapter presents the research methodology adopted throughout the study. The chapter is divided into four sections, as shown below in Figure (6). The first section describes the philosophical and theoretical foundations of the study and explores how these philosophical underpinnings lend themselves to a systems-thinking approach, the method of inquiry (e.g., implementation research), and the subsequent mixed-methods design adopted. The second section describes the study population, procedures, data collection tools, and analysis used within each of the three phases. The third section outlines the study's ethical considerations, the fourth section describes the quality assurance steps, and the fifth section presents a reflexive piece.

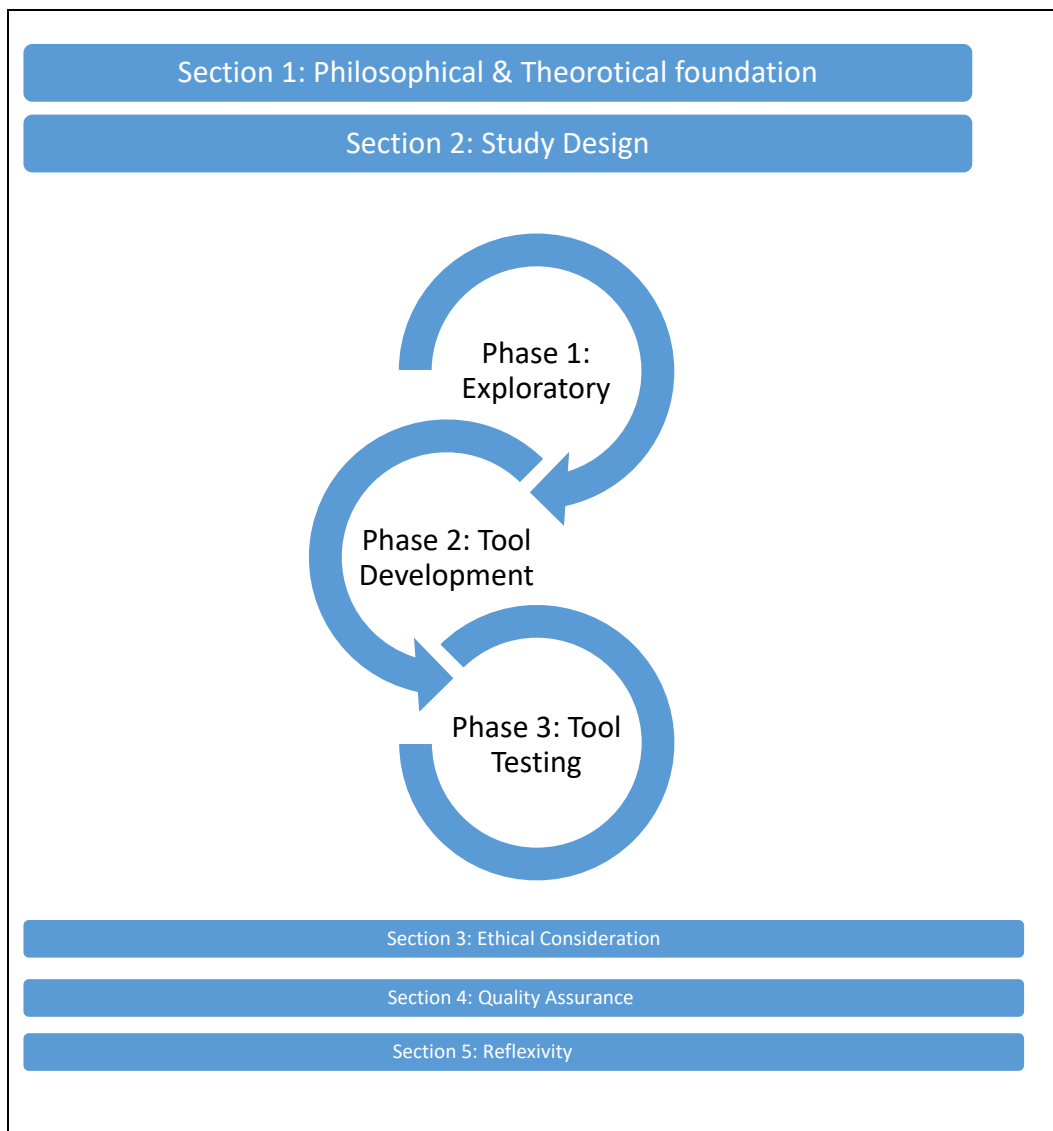


Figure 6 Methods Chapter outline

3.1 Philosophical and Theoretical Foundation- Underpinning Philosophy

This study adopts a pragmatism approach as its overarching epistemology, given pragmatism's emphasis on the (i) importance of context (ii) its focus on finding solutions that work locally, and (iii) its use of pluralistic approaches. Within pragmatism, knowledge claims can arise out of actions, situations, and consequences (Creswell, 2003). Aligned with the aim of the research (i.e., to develop a practical measure of performance among community midwives in low-resource settings), pragmatism places emphasis on how well theory explains and predicts phenomena (i.e., performance), rather than how accurately it describes an objective reality. In this way, pragmatism is consistent with research that seeks to address important questions or solve problems by generating answers or solutions that bring about positive consequences locally. Pragmatism further highlights the importance of generating understanding within a particular context and is oriented towards problem-solving.

The overarching epistemology of pragmatism seeks to answer 'what and how' (Cherryholmes, 1992; Creswell, 2003; J. P. Murphy & Rorty, 1990). Concerning the current study, the first step is to determine 'the what' of performance (i.e., what is performance and how should we define it). This is achieved through a systematic review of the literature, followed by an exploratory study that aims to refine the definition of performance to reflect the phenomenon of performance within the chosen context of the study (i.e., Sudan). The second step, or 'the how' to measure performance, is then achieved through the development of a contextually relevant measure using participatory approaches. How well this theory, or model, explains performance is then tested using structural equation modelling techniques.

In its concern with the search for reality, pragmatism acknowledges that more than one reality is possible and allows for researchers to engage with pluralistic methods and procedures that best meet the needs and purposes of the research objectives (Cherryholmes, 1992; Creswell, 2003; Murphy & Rorty, 1990;

Teddle, 1998). In the current research, applied mixed-methods approaches are used to develop a context-specific measure of performance.

Pragmatism acknowledges that research takes place within different, changing, social, historical, and political contexts and provides essential criteria for assessing the validity of a claim. Moreover, findings must be assessed and interpreted within the context where they are generated, emphasising the importance of context and problem-solving. Therefore, throughout the research process, contextual considerations are given, particularly during the exploratory phase where socio-demographic, cultural, geopolitical climate, and other interacting factors that shape the Sudanese health system are considered.

The idea that performance is behavioural, evaluative, and multidimensional is consistent with measurement modelling, or latent variable modelling theory, where the latent construct, or performance, in this case, is presumed to be causing a number of observational behaviours. The latent variable theory would, therefore, consider performance as an example of a latent construct, which cannot be measured directly, and therefore must be observed through several highly correlated observable variables or indicators. However, before performance can be measured, it must first be conceptualised, with identified domains (or factors) and indicators (or items). The existing body of knowledge found within the literature is thus synthesised with data on how the phenomenon is understood by key stakeholders to help co-define, co-characterise and co-develop a contextually relevant measure of community midwife performance in Sudan. One of the key assumptions forming the foundation of the study is that the latent variable (i.e., performance) is measurable by defining, determining, and measuring a series of observed correlated variables (i.e., items) indicative of performance.

3.1.1 A Systems Thinking for Health Approach

Systems-thinking principles were adopted to conceptualise the study, and implementation research was chosen to address the needs identified within the Sudanese context (i.e., a measure of performance). Strongly aligned to pragmatism, systems thinking is “an approach to problem-solving that views problems as a wider dynamic system” (WHO, 2009a, p 33). Also consistent with pragmatism, systems-thinking demands a deep understanding of the context and

its determinants. The complexity of the health system's multi and inter-disciplinary stakeholders act, interact and react to influence each of the six health system building blocks of service delivery, health workforce, health information, medical technologies, health financing, leadership, and governance in a people-centered framework (WHO, 2009a).

System thinking, like pragmatism, is concerned with how various systems work to influence specific outcomes (i.e., the performance of health workers). It, therefore, aims to know what works, for whom, and under what circumstances in order to tailor interventions to enhance health service provision and optimise service delivery and quality (Evans, 2007; Labonte & Schrecker, 2006; Banati & Moatti, 2008; Schieber et al., 2007; Buse & Walt, 2002; WHO, 2009; Yu, D., Souteyrand et al., 2008). Adopting a system thinking approach, therefore, serves as a useful strategy to understand the context and the forces that operate within and between each health system building block, allowing for a more comprehensive view of the synergies and complementarities that shape a particular outcome (i.e., performance) positively or negatively (WHO, 2009a, 2009b).

Systems thinking, therefore, strongly encourages understanding the perspectives of relevant stakeholders to derive a richer understanding of the context and its problems, tailor relevant solutions, and create a sense of ownership and sustainability (Brugha & Varvasovszky, 2000; WHO, 2009a). Such understanding allows for more tailored interventions or evaluations addressing health system bottlenecks and anticipating a system-wide effect, regardless of the intervention size, complexity, or health system entry point (WHO, 2009).

Overall, systems thinking, as a strategy, provides a useful analytic approach to better understand the Sudanese health system and its interplaying factors. It was therefore employed in this study to promote stakeholder involvement and participatory approaches, to conceptualise local solutions for local problems collectively.

3.1.2 Research Strategy: Implementation Research

The current study adopts an implementation research (IR) strategy. Considered a branch of health systems research, implementation research is defined by Sanders and Haines (2006) as research that:

...seeks to understand and improve how societies organise themselves in achieving collective health goals, and how different actors interact in the policy and implementation processes to contribute to policy outcomes. By nature, it is interdisciplinary, a blend of economics, sociology, anthropology, political science, public health and epidemiology that together draw a comprehensive picture of how health systems respond and adapt to health policies, and how health policies can shape by nature, health systems and the broader determinants of health. (pp. 719-722)

Although new to public health, implementation research is fundamental in many fields, including engineering and management science, health economics, sociology, and epidemiology (TDR, 2011). First developed within the field of political science in the mid-twentieth century (Pressman & Wildavsky, 1984), IR has been increasingly used in public health over the past three decades, building on elements of systems science and translational research (Greenhalgh et al., 2005). IR is also defined as “the systematic approach to recognising, understanding and addressing health system and implementation bottlenecks, identifying optimal implementation options for a given setting, and promoting the uptake of research findings into policy and practice (TDR, 2011, 2017). IR is thus aligned to pragmatism as it favours a systematic, contextual, complex, and multidisciplinary approach to health research.

IR differs from other types of health research (i.e., experimental designs) in many ways. Firstly, IR places importance on the involvement of relevant stakeholders throughout all aspects of the research process: from problem identification, to design, to data collection and interpretation. Here, stakeholder involvement is essential in order to create a sense of ownership that promotes the transfer of knowledge, uptake, use, and sustainability of the research findings and their associated implications (David H Peters, 2014; TDR, 2011, 2017). In this way, IR focuses on promoting the uptake and successful implementation of evidence-based interventions (Sanders D, 2006).

Drawing from the definition, implementation research, therefore, employs science and rigour to systematically avail, integrate and facilitate the uptake of evidence-based public health interventions, while acknowledging the variation of health outcomes across different communities (TDR, 2017). Second, IR is demand-driven, as implementers and relevant stakeholders in the health system, including

beneficiaries, identify which problems and bottlenecks they wish to address with research.

In IR, more emphasis is put on 'bottom-up' approaches by practitioners and relevant stakeholders rather than solely 'top-down' by researchers and academics – thereby differentiating it from other forms of health research. In this way, IR is consistent with pragmatism, as it aims to optimise the quality of health services and to enhance and promote health outcomes by providing practical solutions to real-life problems in any given context. In the current study, performance measures among CMWs were identified as a bottleneck at different levels within the health system, from policymakers to programme implementers (TDR, 2008).

In line with pragmatism, IR also requires an in-depth understanding of the context, its local needs, cultural beliefs, socio-demographics, and community influences that shape the problem. In other words, IR focuses on what works, for whom, under what contextual circumstances, to produce context-sensitive solutions that are scalable and results that are applicable throughout similar settings (Barker, 2014; Sanders D, 2006; TDR, 2017). Finally, IR is as complex as the systems it operates in. IR deals with real-life problems in real-life settings, in an uncontrolled environment, influenced by the different inter-acting factors, allowing it to adopt a non-linear, dynamic and iterative approach for multi-component programme analysis at multi-levels of the health system (supply and demand) (Sanders D, 2006; TDR, 2017).

Though several conceptual frameworks for implementation research exist, these have been predominantly developed and tested in the northern hemisphere. Most of these frameworks explore two basic concepts of implementation research. The first focuses on contextualising innovation tools, strategies, interventions, while the second focuses on enhancing the quality and effectiveness of existing health services and programmes (TDR, 2011). To the first fundamental concept, the current study focuses on the development of a practical contextual measure of performance to optimise the performance of CMWs, which speaks to the second elemental concept of improving access to maternal and child health for women of reproductive age in Sudan.

Damschroder and colleagues (2009) developed the "consolidated framework of implementation research" that covers a number of basic concepts

across five dimensions: the intervention, the inner and the outer setting, the individuals involved, and the process of implementation, as illustrated in Figure (7). The “intervention” is assumed to be contextually adaptable and fit for the health system and is influenced by many players. Here, the ‘intervention’ is the development of a contextually adapted, practical tool to measure the performance of CMWs in Sudan. Next, the “outer setting” includes the socio-economic-political context, necessitating a thorough understanding of the socio-economic, geopolitical, and historical context of reproductive health systems, external to the organisation and which influence the intervention. An extensive desk review, including a review of key policies and documents, is presented in Chapter 2 (section 2.2), and key informant interviews and health system analyses were conducted.

Third, the “inner setting” includes the organisational culture of all relevant stakeholders and fourth, the “individuals” within these organisations, and how they influence the implementation of the intervention. Here, individuals ranged from policymakers, managers, frontline workers, and beneficiaries. Therefore, a stakeholder mapping and stakeholder analysis took place as presented in chapter 2 (section 2.2) to understand better the structure, network, culture of the CMW organisation, including the federal and state ministries of health, where the tool was developed, and where it will be used.

Finally, how the implementation process takes place and how individuals might be affected by the intervention was understood through conducting key informant interviews with stakeholders, IR workshops with the CMWs and the RH state coordinators and focus group discussions with beneficiaries. In specific terms, these were conducted to better understand their assigned tasks, as per their job description and training (Laura J Damschroder, 2009).

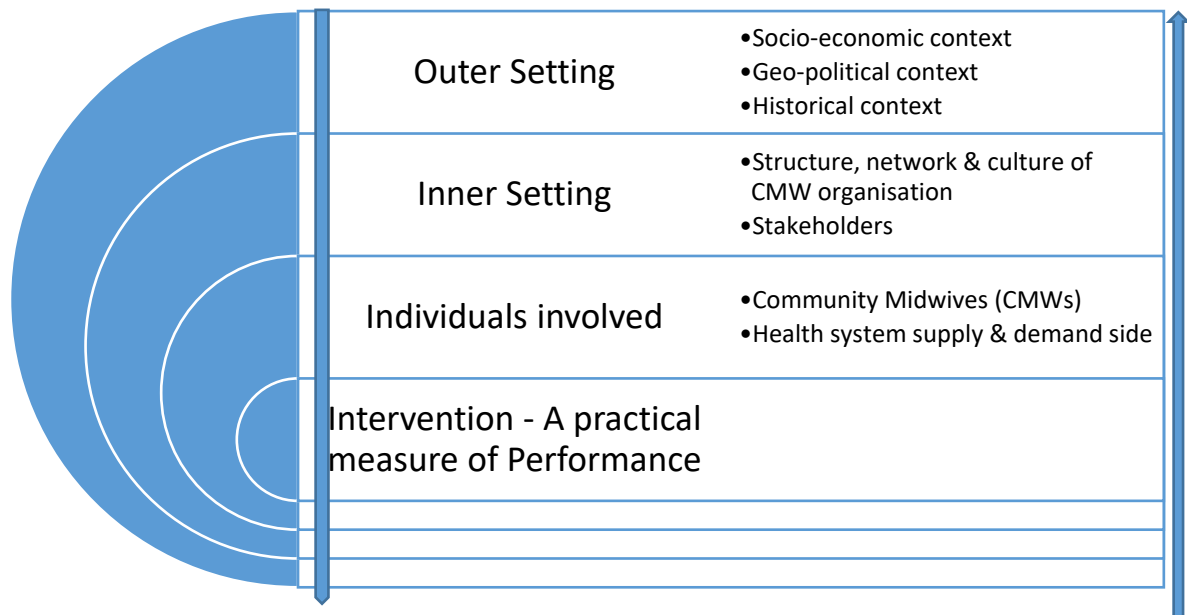


Figure 7 Revised Consolidated IR Framework

Evaluation of IR

IR success is measured by several results, based on several fundamental principles and characteristics. Specifically, findings conducted through IR approaches should be (i) acceptable to the community, beneficiaries and relevant stakeholders understudy, (ii) adopted by them, (iii) appropriately fit for the particular setting and or target group, (iv) feasibly executed in the particular setting or organisation, (v) with high fidelity that what was designed was implemented, at (vi) reasonable implementation cost, (vii) with good coverage within the targeted population and that these results are (viii) maintained, or sustainable (David H Peters, 2014; David H. Peters, 2013; Enola Proctor, 2010).

3.2 Study Design: Mixed- Methods

A mixture of both quantitative and qualitative methods was applied across three distinct study phases to address the overall goal of the research: to develop a practical measure of performance for community midwives in Sudan. The first phase of the study was an exploratory phase designed to determine what constructs are commonly used in existing performance measures and second, to identify any current tools used to measure performance. To address the first objective, a systematic review was conducted to answer the question, 'How do we measure maternal health workers' performance in LMICs?' Linked to the first research objective, the purpose of this review was to identify the key constructs used in measures of maternal health worker performance in LMICs.

Next, and aligned to IR approaches, results of the literature review were synthesised with consultative interviews, and the results of a desk review of existing national policy and strategy documents within Sudan presented in Chapter 2 (section 2.2) to determine what constructs are commonly used to describe the performance of community midwives in Sudan. This second part of the exploratory phase, therefore, took place in the form of an extensive desk review, 13 key informant interviews (KII) and four focus group discussions (FGD) conducted across 8 Implementation Research (IR) workshops with CMWs and RH state coordinators.

The second phase of the study was the tool development phase, which sought to use the results of phase one to design and develop a contextually-relevant tool that measures the performance of community midwives in Sudan. In line with IR approaches, this second phase was focused on co-defining performance and co-determining its constructs through tool development and subsequent testing.

To this end, the second round of IR workshops was held with 20 participants, and a participatory heat map adopted to firstly prioritise, choose, and develop the contextually relevant performance-related constructs identified in phase one. Once identified, these performance-related constructs and their associated items were further co-developed through a review of public documents, performance-related tools identified through the systematic review, and consultative debriefing meetings with the CMW expert group. The resulting draft performance measure tool was subsequently taken to the third, tool testing and refinement phase.

During the third phase, the tool's initial version was administered to a sample of 180 community midwives located across two different states in Sudan. Exploratory and confirmatory factor analysis using latent variable modelling techniques were then applied to refine the tool further. Table (12) summarises the three different study phases, the different methods applied, how each phase corresponds to each of the study's three objectives, and the study timelines. The study extended from April 2016-April 2019 and included two visits to Sudan.

Table 12 Summary of research methods applied per study objective

Research Objective	Study Phase	Study design	Study method	Study population	Sampling strategy	Data collection tool	Data collection timeline
Obj 1: To determine what factor(s) constitute 'performance' of maternal health workers in low and middle-income countries.	What is performance?	Systematic Review	Systematic Review Protocol				
	How do we measure it?						
Obj 2: To determine how to measure performance among community midwives in low resource settings	Understand the concept performance of community midwives	Implementation Research (IR)	Qualitative	Desk Review National documents			
			Qualitative	Supply side: 13 Key informants	Purposive	Interview guide	5 th Dec to 16 th Jan 2017
			Qualitative	Supply side: 17 RH State	Purposive	Focus Group Discussion guide	30 th Dec 2016

				Coordinators FGD			
			Qualitative	Supply side: 8 IR workshops 33 CMW (2 cohorts)	Purposive	CMW Workshop manual	
			Qualitative	Demand side: Beneficiaries 4 FGDs mothers receiving the services	Purposive	Focus Group Discussion guide	
Obj 3: To develop a contextually-relevant tool to measure performance among community midwives in Sudan	Tool Development	Implementation Research (IR)	Qualitative	8 Key Informants + 15 RH state coordinators (2 separate rounds)	Purposive	IR stakeholder workshop manual	16 th and 20 th Dec 2017
				CMW expert group debriefing meetings			2 nd -25 th Jan 2018

<p>Obj 4: To test a tool to measure performance among community midwives in Sudan</p>	<p>Tool testing</p>		<p>Factor Analysis (Exploratory and Confirmatory)</p>	<p>Community midwives</p>	<p>180community midwives randomly selected from different localities</p>	<p>Performance Tool and manual</p>	<p>Gedarrif state 27th Jan to 1st Feb 2018 White Nile 24th Feb to 1st March 2018</p>
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3.2.1 Phase One: Exploratory Phase

Overview

The first phase of the study consisted of an exploratory phase that employed both a systematic literature review and interviews to determine what factor(s) constitute 'performance' of maternal health workers internationally and within Sudan, respectively. This phase, therefore, served to address the study's first two objectives. First, a systematic literature review of existent studies measuring the performance of maternal health workers in low and middle-income countries (LMICs) was conducted to answer the review question: 'How do we measure maternal health workers' performance in low and middle-income countries?' In answering the question, the following information was extracted: (a) Concepts: when measuring performance, which construct are we measuring? (b) Tools Used: how do we measure it? (c) Tool Validity/Quality: how reliable and valid are the tools per construct area? Next, the results of the systematic review were synthesised with the results of an extensive desk review and stakeholder mapping and analysis. The series of KIs, focus group discussions, and participatory workshops conducted with participants from both the supply and demand sides of the health system, including health system stakeholders, RH state coordinators and beneficiaries, and the community midwives themselves.

3.2.1.1 Methods - Systematic Literature Review

3.2.1.1.1 Selection Criteria and Search Strategy

A systematic literature search of studies assessing maternal health workers' performance in LMICs was conducted following the procedures set forth by PRISMA/EPPI Centre. To be selected, studies had to include maternal health workers defined as, "front-line health workers in the community who are not doctors, but who have been trained to diagnose and treat common health problems, to manage emergencies, to refer appropriately, and to transfer the seriously ill or injured for further care (WHO/WPRO, 2001: 1)" and working in an LMIC (see Table (13)) for a list of operational definitions used to formulate the search strategy).

Table 13 Operational definitions

Term	Operational definition
Maternal health worker	Mid-level practitioners are front-line health workers in the community who are not doctors, but who have been trained to diagnose and treat common health problems, to manage emergencies, to refer appropriately, and to transfer the seriously ill or injured for further care (WHO/WPRO, 2001: 1).
Low and middle income countries	as defined by the World Bank 'For the 2017 fiscal year, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of \$1,025 or less in 2015; lower middle-income economies are those with a GNI per capita between \$1,026 and \$4,035; upper middle-income economies are those with a GNI per capita between \$4,036 and \$12,475' ('World Bank Country and Lending Groups – World Bank Data Help Desk', n.d.).

In addition, maternal health workers had to be assessed on their performance delivering maternal and child health care services, trained for at least a year, and licensed or registered within their respective countries/health systems (see Table (14)) for the inclusion and exclusion criteria).

Table 14 Inclusion criteria

<ul style="list-style-type: none"> • Quantitative and qualitative studies • Studies describing the performance of maternal health providers in LMICs • Studies conducted in LMICs (World Bank list) • Studies published 2006-August 2017 • English language studies • Articles Peer reviewed • Studies maternal health providers: <ul style="list-style-type: none"> (a) provide maternal and child health care services; (b) formal training one year and more and; (c) are licensed and or registered
--

Table 15 Exclusion criteria

<ul style="list-style-type: none">• Studies not conducted in LMICs• Maternal health providers:<ul style="list-style-type: none">(a) Allied health professionals that do not provide maternal and child health care services;(b) formal training less than one year;(c) not licensed nor registered;(d) Doctors; medical and Obstetricians and Gynecologists

Measures of maternal health worker performance could be either quantitative, qualitative, or mixed-methods. Experimental, quasi-experimental or non-experimental study designs, adopting quantitative, qualitative or mixed-methods approaches as well as descriptive and observational studies (cohort and case-control) were included, so long as they included a measure of maternal health worker performance delivering maternal health services in LMICs with fewer resources, similar settings, and type of cadres.

The research engines explored were in English. Only peer-reviewed articles were included in the search to enhance the quality of the tools retrieved. Therefore, all grey literature was excluded from the review. A systematic search of the literature was proposed for the following English databases: EMBASE, Medline, CINAHL, PsycINFO, ASSIA, SCIELO, Web of Science, and Cochrane Library. LILACS/DeCS database was excluded due to the restrictiveness of the database, where only specific searches and filters were possible. Once the protocol was set, search strings were developed and piloted for each database. The search covered the following keywords, relevant synonyms, and controlled vocabulary for each database, concerning studies' exposure, participant, and setting criteria.

Criterion 1: Performance Index words:

1. **Medline:**(MH "Task Performance and Analysis") OR (MH "Work Performance")
OR (MH "Employee Performance Appraisal")

2. **CINAHL:** (MH "Employee Performance Appraisal") OR (MH "Performance Measurement Systems") OR (MH "Task Performance and Analysis") OR (MH "Job Performance") OR (MH "Motivation") OR (MH "Workload") OR (MH "Teamwork") OR (MH "Job Satisfaction") OR (MH "Presenteeism") OR (MH "Productivity") OR (MH "Absenteeism")
3. **PsycINFO:**DE "Performance" **OR** DE "Group Performance" **OR** DE "Job Performance" **OR** DE "Test Performance" **OR** DE "Employee Efficiency" **OR** DE "Employee Productivity" **OR** DE "Competency"
4. **Embase/ Emtree:** 'performance'/exp AND 'task performance'/exp
5. **Web of Science** No control language
6. **Cochrane:** MeSH descriptor: [Employee Performance Appraisal] explode all trees OR MeSH descriptor: [Work Performance] explode all trees OR MeSH descriptor: [Task Performance and Analysis] explode all trees
7. **ASSIA** No control language
8. **SCIELO** "Performance" OR "Competency"

Keywords:

"Performance" OR "Task Performance and Analysis" OR "Employee Performance Appraisal" OR "Work Performance" OR "Quality Improvement" OR "Staff Development" OR "Self-Evaluation Programs" OR "Aptitude Tests" OR "Job Performance" OR "Absenteeism" OR "Workload" OR "Job Satisfaction" OR "Teamwork" OR "Job analysis" OR "Job satisfaction" OR "Presenteeism" OR "Productivity" OR "Performance Measurement Systems" OR "Vocational performance" OR "Performance Evaluation" OR "Competenc*" OR "Productiv*" OR "Efficiency" OR "Efficacy" OR "Ability" OR "Capacity" OR "Work Capacity" OR "Employee Productivity" OR "Employee Efficiency" OR "Employee Evaluation" OR "Employee Performance" OR "Personnel Evaluation" OR "Health Care Quality"

Criterion 2: maternal health worker Index words:

1. **Medline** (MH "Allied Health Personnel") OR (MH "Maternal Health Services") OR (MH "Midwifery") OR (MH "Maternal Health") OR (MH "Nurse Midwives") OR (MH "Obstetric Nursing") OR (MH "Maternal-Child Nursing") OR (MH "Doulas")
2. **CINAHL Index words:**(MH "Midwives") OR (MH "Midwifery Service") OR (MH "Maternal Health Services") OR (MH "Maternal-Child Nursing") OR (MH "Doulas")
3. **PsycINFO:** DE "Midwifery" OR DE "Prenatal Care"
4. **Embase/ Emtree**'doula'/exp OR 'postnatal care'/exp OR 'prenatal care'/exp OR 'nurse midwife'/exp OR 'maternal welfare'/exp OR 'maternal health service'/exp OR 'maternal child health care'/exp OR 'community health nursing'/exp OR 'midwife'/exp
5. **Cochrane:** MeSH descriptor: [Doulas] explode all trees OR MeSH descriptor: [Maternal-Child Nursing] explode all trees OR MeSH descriptor: [Obstetric Nursing] explode all trees OR MeSH descriptor: [Nurse Midwives] explode all trees OR MeSH descriptor: [Maternal Health] explode all trees OR MeSH descriptor: [Midwifery] explode all trees OR MeSH descriptor: [Maternal Health Services] explode all trees OR MeSH descriptor: [Allied Health Personnel] explode all trees
6. **ASSIA**No control language
7. **SCIELO:** Prenatal care
8. **LILACS** (2 Chunks): "Allied Health Personnel" OR "Maternal Health Services" OR "Midwifery" OR "Maternal Health" OR "Nurse Midwives" OR "Maternal Child Nursing" OR "Doulas" OR "Midwife" OR "Midwives" OR "Obstetric Nurse" OR "Birth Attendant" OR "Maternal Welfare" OR "Maternal Care" OR "Maternal Child Health Care" OR "Prenatal" OR "Postnatal" OR "Antenatal" OR "Labor and Delivery" OR "Labour and Delivery" OR "Maternal Child Health Service"

Keywords:

"Allied Health Personnel" OR "Maternal Health Services" OR "Midwifery" OR "Maternal Health" OR "Nurse Midwives" OR "Maternal-Child Nursing" OR "Doulas" OR Midwif* OR Midwiv* OR "Obstetric Nurs*" **OR** "Birth Attendant*" OR "Maternal Welfare" OR "Maternal Care" OR "Maternal Child Health Care" OR "Prenatal" OR "Postnatal" OR "Antenatal" **OR** "Labor and Delivery" OR "Maternal Child Health Service*"

Criterion 3: Low and Middle Income Countries (LMICs), the **Index words:**

1. **Medline:** (MH "Developing Countries")
2. **CINAHL Index words:**(MH "Developing Countries")
3. **PsycINFO:**(MH "Developing Countries")
4. **Web of Science** No control language
5. **Cochrane:** MeSH descriptor: [Developing Countries] this term only
6. **ASSIA**No control language
7. **SCIELO**
8. **Embase/ Emtree:** 'developing country'/exp

The search covered a wide range of peer-reviewed studies published in academic journals since 2006. The year 2006 was chosen as it corresponds to the year the World Health Organisation launched its flagship HRH report under the title of 'Working together for health' and the establishment of the Global Health Workforce Alliance (GHWA), both of which preceded a global movement and over a decade of commitment towards improving the conditions thought to improve HRH performance, as described in greater detail in Chapter 2 (section 2.1).

3.2.1.1.2 Data Analysis and Quality Assessment

Based on the above search strategy, and guided by PRISMA guidelines, titles and abstracts were retrieved and references were imported into Endnote. Each search was run in the following order, with the number of articles retrieved in total detailed in Table (16) below:

- 1- Criterion 1: performance (index term per data base and keywords)
- 2- Criterion 2: Maternal Health worker (index term per data base and keywords)
- 3- Criterion 3: LMIC (index term per data base and keywords)
- 4- Combine Criterion 1+ 2+ 3
- 5- Date range filter 2006- August 2017
- 6- Filters: Peer review; English Language and Humans (when option filter option found)

Table 16 Number of articles per search engine

	Medline	CINAHL	PsychINFO	Embase	Web of Science
Performance	2,721,906	481,917	767,998	939,619	6,573,327
Maternal Health Worker	234,139	67,781	37,153	74,729	211,130
LMIC	891,921	171,812	148,194	110,501	2,435,891
Combine	2,153	886	315	189	2,390
Date Range	1,698	785	268	172	1,747
Peer review / engl / Humans	1,226	746	189	142	1,703
TOTAL:	1,226	746	189	142	1,703

Table 17 Number of articles per search engine

	Cochrane	ASSIA	SCIELO
Performance	271656	148,293	80,998
Maternal Health Worker	9423	14,078	3,886
LMIC	36125	73,214	145,072
Combined	340	308	136
Date Range	340	267	112
Peer review / engl / Humans	340	251 (no option for humans)	42
TOTAL:	340	251	39

References were retrieved during the 15th-31st of August 2017. They were then screened for duplicates in two rounds, automatic and manual. Table (18) shows the number of duplicates removed. A total of **2,413** original articles were imported into a new folder created under the name 'original articles'. Once the duplicates were removed, remaining references were imported into Covidence (Cochrane, 2017) for title, abstract, and full-text screening. Two authors independently screened the studies to identify those that met the inclusion criteria. Any disagreement between reviewers was resolved by a third reviewer.

Table 18 Number of final articles for screening per search engine

	Medline	CINAHL	PsychINFO	Embase	Web of Science	Cochrane	ASSIA	SCIELO
Search result	1,226	746	189	142	1,703	340	251	39
Discarded	0	365	124	20	602	160	176	24
Screening result	1226	381	65	122	1101	180	75	15
Combined library	3,165							
Re screening	2,413							

An aggregate descriptive and analytic general approach synthesis was adopted. The narrative synthesis of the findings from the included studies was structured around the type of performance measure used, maternal health worker characteristics, and type of performance tool. Two review authors extracted the data independently using a pre-piloted data extraction form created within Microsoft Excel. Extraction information included: study setting, year of study, maternal health worker characteristics (i.e., name, entry requirement, type and duration of the training, description of task) and information on the study methodology, including details of the performance tool/construct used, outcome measurement, mode of administration, and information on the reliability and validity of performance tool,

where available. Studies were also subjected to a concept analysis, whereby factors or constructs used to measure performance were identified.

Finally, and to ensure reliable, evidence-based studies and to assess the risk of bias in included studies, review authors independently conducted quality assessment using Standard quality assessment criteria for evaluating primary research papers (QualSyst). QualSyst was chosen, given its widespread use to assesses the quality of diverse study designs (Kmet, Cook & Lee, 2004). Both the quantitative and qualitative assessment tools were combined, as well as the criteria enlisted in the Annex (3). Quality scores were calculated as pre-defined, where total scores were scored depending on the degree to which the specific criteria were met.

3.2.1.2 Methods – Exploratory Phase

3.2.1.2.1 Participants and Procedures

In addition to the systematic literature review, the exploratory phase consisted of an extensive desk review of key policy documents, as presented in Chapter 2, key informant interviews, a series of IR workshops, and focus group discussions. In line with IR approaches, the exploratory phase involved extensive consultation with various stakeholders to understand better the context of the reproductive health system in Sudan and the perception of key stakeholders on maternal health provider performance. The exploratory phase procedures are summarised in Figure (8):

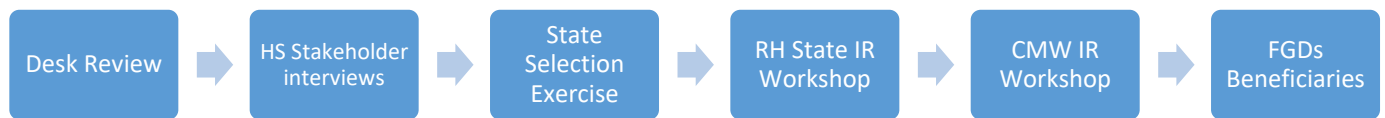


Figure 8 The sequential order of this exploratory phase of the study

Accordingly, the exploratory phase of the study employed purposive sampling techniques, derived from the stakeholder list in chapter 2 (section 2.2). In some instances, snowballing techniques were also employed to identify interviewees. Potential participants were approached with a formal request for participation via

email, phone call, and in-person to firstly, inform them of the nature of the study and to request their participation. A participant information leaflet (see Annex (4) for English version) was made available, and potential participants were allowed to ask questions. Potential participants were then given a minimum of seven days to consider whether to participate. After seven days, I contacted the potential participants, and if they still agreed to take part in the study, a verbal and written consent (see Annex (5) for English version) was obtained.

A total of 13 key informants were recruited and approached for key informant interviews that were previously identified through the stakeholder mapping described in chapter 2 (section 2.2). Key informants included federal and state ministries of health, Sudan Medical Specialisation Board, International organisations as WHO and UNFPA, experts, allied health workforce union as enlisted in below in Table (19). Interviews were held in the form of scheduled appointments in their offices. Next, Reproductive Health State Coordinators were recruited. State Coordinators are employees of the State Ministries of Health (SMoH) and, among other responsibilities, oversee assessing the eligibility of candidates for recruitment into the community midwife (CMW) programme. In some instances, State Coordinators are also involved in CMW training and hiring.

Focus group discussions with State Coordinators were held during the annual Primary Health Care (PHC) meeting in the form of an IR workshop hosted by the Federal Ministry of Health (FMoH) during the week of the 26th of December 2016. The PHC-Director General (DG) and the National RH Programme (NRHP) Director agreed to my request to conduct an IR workshop with the RH state coordinators and allowed a three-hour slot for that activity as part of the PHC Annual meeting. Verbal consent was obtained from participants before attending the workshop, and they were informed on the study before arrival to Khartoum for the meeting. The workshop started with a brief introduction reminding them of the study's purpose and objectives. Participants were grouped into groups of four for the FGD, before sharing the key messages discussed in their FGDs in a plenary session. The first IR workshop involved participation from the RH State Coordinators from 17 states, representing all states except for Khartoum state. Four facilitators were recruited from the NRHP to

assist in facilitating the smaller FGD. Facilitators were informed of the study procedures and trained in facilitation methods before the meeting.

Community midwives were recruited through two cohorts of CMWs who had graduated from the CMW programme delivered by the Academy of Health Sciences (AHSs). Cohorts were delineated by those considered to be (i) in the educational pipeline, defined as those who had been trained but had never practiced as a CMW, and those considered being in (ii) the health labour market, defined as those active as CMWs for a minimum of two years. The first cohort was considered part of the educational pipeline and included women from the five Darfur states, who had trained in Khartoum North (Bahri) as part of the acceleration plan. The first group was 15 females; age 15-18 years old; from the Western part of Sudan (i.e., the five Darfur states), literate, enrolled in the community midwife programme, had finished training, had passed the final exam and were due to graduate. The first cohort was recruited via the director of the CMW training institution, who acted as a gatekeeper.

The second, 'health labour market' cohort consisted of 13 CMWs, some of the first to be trained as part of the CMW programme, and that had practiced for a minimum of two years. The second cohort was identified by the Gedarrif State RH State Coordinator, with representation from its different localities. Following recruitment, CMWs were invited to attend a series of workshops held over two days. Three workshops were conducted per day, for a total of six workshops. Each workshop session ran over two hours and was designed, so the outcome of each workshop would inform the following session. The workshops were designed to gain a better understanding of this new cadre, her perceptions of her job, and the reasons she chose to become a community midwife. The titles and objectives of the workshops are shown in Table (19) below.

Each workshop would start by introducing the session and providing a summary of the previous session. The workshop incorporated several different methods, including individual, group exercises, and plenary. Varied approaches, including reflection, storytelling, and role-plays, were also used, followed by a discussion to generate consensus amongst the participants themselves. At the end of each workshop a reminder of the objective of the session and a summary of its main findings were discussed, in addition to encouraging reflections from the participants.

Table 19 The session title and objective of the CMW workshop

Session Title	Session Objective
<ul style="list-style-type: none"> • Why am I a community midwife 	to examine why people become community midwives, and how these reasons influence their relationship with women clients
<ul style="list-style-type: none"> • How do our clients see us 	to investigate community midwives' ideas about how their clients see them, and how this influences their relationship with them
<ul style="list-style-type: none"> • Women's status in society 	to explore community midwives understanding of the important factors that influence the degree of control that women have on their day-to-day lives and decisions
<ul style="list-style-type: none"> • Unmet need 	
<ul style="list-style-type: none"> • Overcoming Obstacles at work: 	to investigate the factors community midwives identify in their work situations that affect their relationships with their clients
<ul style="list-style-type: none"> • Solution 	

Finally, beneficiaries were recruited to take part in several focus group discussions. Beneficiaries were women of reproductive age (15-49 years old), prima/multi/grand multipara that stand to benefit from the services of the community midwife during antenatal, natal, postnatal, puerperium, family planning, neonatal and child care services. Four FGDs were conducted with beneficiaries across two different states of Gedarrif and White Nile states, with two FGDs taking place in each state. Beneficiaries were recruited through the RH State Coordinators, midwifery schools, and locality health visitors. Women had to have been a recipient of services from CMWs to participate in the FGDs. Beneficiaries were purposively identified through primary healthcare (PHC) centres that offered maternal health services. The rest of the participants for the FGDs were recruited through snowballing techniques.

Beneficiaries were informed by the locality health visitor of the study, briefed, and were given a participant information leaflet, seven days before the FGD. The date, time, and venue were further coordinated and agreed upon based on the convenience of the participants. The FGDs took place at two PHC centres, one midwifery school, and hospital. Table (20) summarises the profile of participants who took part in the exploratory phase of the study

Table 20 Stakeholders interviewed

Stakeholder Type		Number	State	Stakeholder Profile
Key Informant	KII	13	Federal Level	Governance and Policy level Federal Ministry of Health (4) Human Resources Development Directorate Nursing and Midwifery sub-Directorate Primary Health Care Directorate General Reproductive Health sub-Directorate State Ministry of Health (1) White Nile: Nursing and Midwifery Directorate
				Implementation/production level (3) Training body- Academy of Health Sciences Community midwife Curricula development Community midwife senior instructor Community midwife supervisor
				Expert (2) reproductive and maternal health in Sudan human resources for health in Sudan
				Professional union (1) Representative
				Employee of UN agencies (2) WHO, UNFPA
RH state coordinators	FGD	17	17 states	Assess the eligibility of candidates for recruitment into CMW programme, train and hire CMW
CMW	IR Workshop	15	5 Darfur States	Educational Pipeline
		13	Gedarrif State	Health labour market
Beneficiaries	FGD	2 FGD: 14	Gedarrif	Women had to have been a recipient of services from CMWs
		2 FGD: 16	White Nile	

3.2.1.2.2 Study Location

As described in greater detail in Chapter 2, Sudan is a federal system, divided into 18 states. Study states were chosen in consultation with health system stakeholders, identified during the stakeholder mapping exercise, as presented in Chapter 2 (section 2.2). States were selected based on the range of RMNCH and health system indicators, as well as the availability and accessibility of CMWs. States considered too dangerous or unstable were excluded. Two states were ultimately chosen, including the White Nile state in the south and Gedarrif state in the east. The states represent both a post-conflict and a stable context, with both semi-urban and rural settings, respectively.

3.2.1.2.3 Measurement Tools

Tools were developed in both Arabic and English language to cater for the range of participants involved and study setting. A semi-structured interview guide was developed to elucidate key informants' current understanding of performance, based on the objectives of the study and literature findings (see Annex 6). All key informants received a copy of the interview guide before the interview, along with the participant leaflet and informed consent. The interview guide aimed to:

- Develop a better understanding of the status of reproductive and maternal health in Sudan;
- Identify current challenges with performance measurement;
- Identify the perception/definition of performance of community midwife;
- Determine what factors constitute excellent performance of a community midwife;
- Propose factors to measure performance, specific for the country context
- Identify the states to test the tool further in (phase three)

The guide for the focus group discussions held with the State Coordinators was developed based on the objectives of the study, the results of a preliminary analysis of the KIs held with key health system stakeholders, and was informed by the proceedings of the first day of the annual PHC meeting. An initial topic guide was circulated to the NRHP Director and research focal point for review, and the

questions were piloted with senior RH officers at the FMoH to ensure the language and flow of questions. A translated version of the FGD question guide is presented in Table (21)

Table 21 FGD question guide

Theme	Probing Questions
Community Midwife	Who is a CMW? What is she trained on? What is expected from her?
Performance Definition	How do you define performance? Characteristics? What influences the CMW's performance? What influences her performance positively? Negatively?
Performance Characteristics	What is a good performing CMW mean? What characteristics and responsibilities?
Performance measurement	What should be measured in assessing a CMW's performance? How? When? By whom? How often?

The interview guide for use with the CMWs was based on a tool developed by the World Health Organisation- Special Programme for Research and Training in Tropical Diseases (WHO-TDR) in 1995, entitled "Health Workers for Change: A manual to Improve Quality of Care".

The focus group discussion guide for use with beneficiaries was developed based on the study's objectives, literature review, and preliminary analysis of the KIs and RH State Coordinators FGDs. It was further piloted, with minor linguistic changes incorporated into the Arabic version. The main thematic areas of the FGD aimed to get the demand's side understanding of the themes listed in Table (22) below.

Table 22 FGD themes

Theme	Probing Question
Healthy Pregnancy	perception of a healthy pregnancy and child birth
CMW performance	quality of reproductive and maternal health services provided by the community midwife (expectations +reality)
CMW Satisfaction	acceptability of the community midwife cadre as a healthcare provider

3.2.1.2.4 Data Analysis

According to Maykut and Morehouse, in qualitative data analysis, "the task of the researcher is to find patterns within [the participants'] words and to present those patterns for others to inspect while at the same time staying as close to the

construction of the world as the participants originally experienced it" (Maykut & Morehouse, 1994). Thematic analysis was adopted in this study phase as the primary data analysis method (Braun & Clarke, 2006). Given that the objective of the study was to develop a practical measure of performance among CMWs, thematic approach allowed for the space to well-define and understand the context by answering the 'why' and 'how' of pragmatism.

3.2.1.2.4.1 *Thematic Analysis*

Aligned with IR, thematic analysis was employed to develop an in-depth, contextual understanding, description, explanation, and meaning of the study participants' perceptions towards performance and its characteristics, measures, as they pertain to receiving care from a CMW. As an analytical method, thematic analysis allows for codes to be identified into categories, whereby categories are generated from the participants' inputs and discussion and identified by the researcher as significant to the focus-of-inquiry (i.e., performance). This integrative analytic approach was adopted to allow for the analysis to preserve the value of the open, exploratory, qualitative inquiry, while simultaneously remaining open to any emerging themes.

Text units were identified and grouped between categories, which were later compared. Relationships were developed, and understandings emerged that subsequently influenced the categories' content and definition, further refined throughout the analytical process. As described by Taylor & Bogdan (1984), this method allows the researcher to code and analyse data to develop concepts simultaneously and "by continually comparing specific incidents in the data, the researcher refines these concepts, identifies their properties, explores their relationships to one another, and integrates them into a coherent explanatory model" (p 126).

Thematic analysis was conducted using NVivo (Version 11) using a six-stage method described by Braun & Clarke (2006). This method includes data management and familiarisation, initial coding, identification of themes, reviewing the themes, defining and naming themes, each of which is described in greater detail below. The use of the software allowed for the management of the different qualitative data sets, from different sources, in a trustworthy and plausible manner,

where the data movement, coding pattern, conceptual mapping of categories, and progression through the analytical stages is well documented.

First, data from the 13 semi-structured interviews, four focus group discussions, and IR workshops were translated into English and transcribed into a Microsoft Word document. I then re-listened to the recordings while reviewing the English translated transcripts. Transcripts were read and re-read with initial ideas noted down to familiarise myself with the data. Files were then imported into NVivo for subsequent coding and analysis.

Next, an open coding phase was applied whereby codes were repeatedly identified by repeatedly reading through the transcripts, line-by-line, and systematically listening to the recordings for all of the qualitative data sets. Here, a code is defined as 'the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon' (Boyatzis, 1998). The codes were allocated clear labels and definitions (Maykut & Morehouse, 1994).

The initial inductive analysis and identification of key themes was conducted to each of the different data sets as per the population group, for example the health system stakeholders' interviews, the RH state coordinators, CMWs and beneficiaries FGDs. Next, for each data set the initial codes were re-ordered into groups under categories of sub-themes. The data was, therefore, restructured into a framework that made sense to further the analysis. Similar codes were merged, distilled, and re-labeled to ensure they accurately reflected the defined coded content. By the end of this stage, codes had been reorganised into sub-themes, and sub-themes were assigned to potential themes.

As a fourth step, the text units under each sub-theme and theme were re-visited to ensure a logical flow, clear pattern, and identifiable distinctions between them. Further collapse, creation, and division of new themes and sub-themes were conducted by re-approaching the data several times. Each data set had its separate framework developed.

Finally, the study's conceptual framework and the frameworks of the health system stakeholder interviews, RH state coordinator workshops, beneficiaries' focus group discussions, and CMW workshops were synthesised to further advance the theoretical framework as the tool development phase. The themes from each framework were consolidated in a more abstract, philosophical, and literature-

based manner to create a final framework of themes and to explore their inter-relatedness. Individual themes were checked against the original data set to ensure that it reflected its precise meaning and that there was sufficient evidence to support each theme's formation. Accordingly, the themes and sub-themes were further 'defined and refined'. Each theme was clearly defined, and subsequent data extracts/codes were organised coherently and consistently. This integration step allowed for the different voices to be heard (Moran & Butler, 2001), and the level of research findings accuracy and confidence to increase (Kelle, 2005).

3.2.2 Phase Two: Tool Development

Overview

The findings of the exploratory phase were then taken forward to develop a contextual understanding of performance, its primary constructs, measurement methods, and modalities. This tool development phase of the study consisted of three sequential stages, as shown by the figure below.



Figure 9 The sequential order of the tool development phase

3.2.2.1 Participants and Procedures

In the first stage, another series of IR workshops were conducted to develop the basic framework of the contextually relevant performance tool, based on the results of the systematic review and the formative qualitative exploratory study. Aligned with IR principles, IR workshops employed participatory methods. Two IR workshops were conducted with two cohorts. The first IR workshop participants

were health system stakeholders – the key informants that participated in the first phase of the study. The second IR workshop participants were RH State Coordinators representing all states in Sudan, except for River Nile and Northern states. Each workshop was conducted independently to maintain the homogeneity and dynamics of the gathering and minimise any power differential that may arise across stakeholder groups.

The first workshop participants were determined based on the results of the stakeholder mapping exercise produced as part of the exploratory phase. Potential participants were informed of the study via email and phone call four weeks before their arrival to Khartoum. The event and workshop date was scheduled based on what date was most convenient for participants. Upon my arrival to the study context, I further contacted potential participants via phone.

The second IR workshop was conducted with the RH state coordinators. I contacted the RH State coordinators and obtained their verbal consent. The FMoH's PHC Director-General and UNFPA coordinator generously agreed to allow a three-hour slot during the annual joint review meeting between FMoH and UNFPA (2017) to conduct the workshop. The proposed methodology was a heat map exercise, adopting a participatory approach. The workshop material was developed beforehand, based on the findings from the first exploratory phase of the systematic review and qualitative formative study.

The first part of the workshop aimed to remind participants of the study rationale, objectives, and methods and presented the findings of the first phase of the study (i.e., the systematic review and qualitative exploratory study). This procedure was in line with IR, which stresses the importance of disseminating findings of the study to relevant stakeholders throughout the study's life and not only at the end of the research ([TDR, 2017](#)).

In stage two, and based on the results of the exploratory phase, a priority exercise was conducted using heat-mapping techniques. The basic concept of the heat map was such that the primary performance constructs identified from the systematic review and the qualitative study were presented first. The constructs were then further discussed to ensure that the participants had a shared understanding of each, which included a translation of the constructs in the

Arabic language. Each participant was then provided with a voting number and, based on the discussion, was asked to prioritise each of the performance constructs as one of four categories: high priority, medium priority, low priority, and not a priority for the measurement of CMW in the Sudanese context. Coloured 'Post-it' notes were made available, where pink was indicative of high priority, orange- medium priority, yellow- low priority, and green, not a priority. Votes were counted per construct priority level and frequency. The resulting heat-map was further discussed, and the constructs to take forward for item development in the third part of the workshop were agreed upon.

The third part of the workshop was used to develop items for each of the priority constructs identified in the previous phase. Participants were divided into two groups and tasked with developing items under each performance construct. Each group had a chair and rapporteur to moderate the group discussion, and the group referred to key documents, such as the CMW curricula and protocols. Group discussions were followed-up in plenary, where each group presented the items generated within their groups. The Tool development phase continued, while based at the RH directorate at the FMOH, referencing back to national documents, unpublished reports, and published literature together with a continuous, rigorous consultative process to further develop the themes, items, statements and modality of the performance tool.

The community midwife (CMW) expert group Table (23) was developed by recruiting experts in the field of RMNCH at both federal and state levels. The expert group was formed to provide constructive feedback on item identification, prioritisation, and contextual realities in the field. The aim was to also review and evaluate tool items for content and face validity, clarity, conciseness, and reading level. They were also invited to propose a number of new test items and made suggestions as to the proposed modality and length of administration of the tool. Participants in the expert group were recruited to ensure representation from human resource management, development, and educational perspective (as listed below). Each participant was involved in the process of the CMW cadre development, PHC expansion programme, with expertise ranging from one to three decades in health systems. Participants were selected according to their position, the body they represent, and expertise in the field of study. The CMW

expert group was approached via a formal request for participation, and I scheduled appointments to meet with them in their offices.

Table 23 Profile of community midwife (CMW) expert group

Community Midwife Expert Group			
Policy and Governance level	Production level	Governance and Implementation at Federal and State levels	UN Agencies
Human Resources Development Directorate Academic Secretary, Academy of Health Sciences- CMW curricula Nursing and Midwifery	Midwifery training complex	Primary Health Care Directorate UHC Expansion Program	Reproductive Health World Health Organisation Safe-motherhood, UNFPA
CMW in-service research -Public Health Institute (PHI)	OBGYN-UNFPA CMW adviser	Reproductive Health Directorate(sub-directorate) Maternal and Child Health Safe motherhood Maternal and Child Health Research	

Where existing scales of the identified constructs were available, these scales were translated into Arabic and back-translated by three bilingual researchers and subsequently compared to the original English versions. These were presented to the CMW expert group for further discussion and items considered relevant to the Sudanese context were retained for the tool testing phase.

3.2.2.2 Measurement Tools

The IR workshop material for the first stage was developed in English and Arabic. The material consisted of the list of the constructs identified in the systematic review and results of the explorative qualitative study. Results were presented on PowerPoint during the first part of the workshop. Each construct was

initially developed to capture aspects of performance described in the systematic literature review and identified from the exploratory study. The results of the workshop were shared with the CMW expert group via email. A series of feedback debriefing meetings were conducted with each of the CMW expert group members at this preliminary stage to provide constructive qualitative feedback on the following:

- The constructs priority and inclusion in the tool;
- The items under each construct;
- the significance of the questions;
- the sequence and logic behind each question;
- the clarity of the question

Taken together, these participatory stages led to the development of an initial draft of the CMW performance tool, which was subsequently brought forward for testing in the third phase.

3.2.3 Phase Three: Tool Testing Phase

3.2.3.1 Participants and Procedures

The draft tool developed was subsequently submitted to the formal national channels within the PHC Directorate at the Federal Ministry of Health, for official endorsement. Following endorsement, the tool was administered for testing to a sample of 30 CMWs located in Khartoum state. Respondents were females, aged 25-40 years, secondary school certificate holders, and graduates of the community midwife programme provided by the midwifery schools affiliated to the Academy of Health Sciences (AHS). As previously highlighted, the community midwife programme was only established in 2013. Therefore the range of experience of the CMWs ranged from 1-3 years in their current job.

Cognitive testing was conducted with two different cohorts of CMWs in Khartoum state, each from different localities to gain a better understanding of the respondent's thoughts regarding the questions asked in the tool, how the respondents comprehend the questions, whether the item makes sense to the respondent, the quality of questions and, to understand whether the questions gather intended information. Based on the cognitive model of response

processes, cognitive testing was therefore used to minimise response errors and further refine the questions (Collins, 2003). The approval to conduct the fieldwork for the cognitive testing was obtained following a series of letters, requests, and clearances from Federal to State and locality levels. The RH Director of Khartoum state Ministry of Health was approached with all requested documents submitted. The RH Director assigned the CMW Coordinator to contact the RH Locality Coordinator to inform her of the study and further agree on logistics, including the venue, duration of the exercise, and refreshments. A sample size of 30 CMWs was recruited.

After the cognitive testing stage, the tool was administered to 180 CMWs in the states of Gedarrif (n=90), in the East, and White Nile (n=90), in the South of the country, over four weeks. Both states were chosen based on their health indicators; security condition and accessibility of the CMWs. All 180 participants were female, aged between 25-40 years of age, were literate, had low socioeconomic status, and resided within their states. In all but four cases, all participants were working within their local communities, where they had also trained. CMWs were randomly selected for recruitment from different localities within each state, based on the inclusion criteria. They were recruited through the RH State Coordinators, together with the state midwifery school Director, who communicated the purpose of the survey and study to their respective locality coordinators.

Table 24 Distribution of CMWs interviewed per locality and state

State	Locality	Number of respondents
Gedarrif state (West)	Nine out of twelve localities	90
White Nile state (South)	Six out of nine localities	90

The CMWs were recruited to the midwifery school, where the data collection took place. Most of the CMWs that were seen in the afternoon spent the night in the midwifery school. Therefore preparations for accommodation and meals were made. Two separate spaces were made available for both researchers to work simultaneously. Each room was well lit, ventilated, and quiet. In the instance where CMWs were directly observed in the completion of a task, three separate stations were prepared. The initial version of the performance tool took approximately 40 minutes to complete. The CMW would leave the premises, i.e., the midwifery

school, after completion and were instructed not to communicate the process with her colleagues.

3.2.3.2 Research Assistant

I recruited a research assistant based on his knowledge, experience, and skills. Several meetings were conducted with the research assistant to explain the study objectives, methodology, phases, and tools. The research assistant also received training on neonatal resuscitation.

3.2.3.3 Researchers debriefing meeting

Daily debriefing meetings between myself and the research assistant were conducted at the end of each data collection day to reflect on the general flow of work, the venue, logistics, CMWs availability on time. Furthermore, to discuss the tool flow of questions: logical sequence, question structure, omit/change/rephrase questions. Also, a note was taken regarding the participants' responses to the four areas of cognitive testing described below.

3.2.3.4 Measurement Tools

Cognitive testing was conducted using the following four areas for evaluating responses: comprehension, retrieval, judgement, response (Tourangeau, 1984). Comprehension refers to whether the questions are clear and whether the respondent could understand the question or statement. The aim is to ensure that questions are not too complicated, long, or contain unknown or unfamiliar terms or concepts. Retrieval tested the recall of the answer to the questions. Judgment tested the respondent's evaluation of the question and estimation of the response, including sensitivity to measure a range of responses on the Likert scale. Response tested the respondents' answers to the question, if the response was incomplete or mismatched to the understanding of the question, or if it was influenced by social desirability. In the second stage, tool administration, the initial version of the Performance Measurement Tool was tested with the 180 CMWs identified.

The three sub-scales for job satisfaction, perceived supervision, and motivation were translated by three bilingual researchers from English to Arabic, back-translated, piloted, revised, and compared to the original English version before being administered. Furthermore, the wording/phrasing in Arabic was discussed with the CMW expert group during the debriefing session. The clarity, meaning,

expected answer, and comprehension of the scales was also thoroughly discussed.

3.2.3.5 Data Analysis

The data were entered, cleaned, and analysed using Statistical Package for the Social Sciences (SPSS), Version 24. The management of the data was conducted in Sudan following the procedures outlined in the ethics section, below. All data were analysed using factor analysis, or latent variable modelling techniques, using MPlus (Version 7.4). Exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and multiple linear regression were all used to explore the tool's factor structure, ascertain the construct validity of the tool, and explore the relationship between performance factors and known predictors, respectively (Browne, 2001; Schmitt & Sass, 2018).

In the instance where new items were developed, the grouping of items was explored using exploratory factor analysis, which is generally recommended to test the factor structures that lack strong theory or hypotheses (Gorsuch, 2003; Schmitt & Sass, 2018). The model was run using mean and variance-adjusted weighted least squares (WLSMV) estimator. The WLSMV estimator was used as it provides accurate parameter estimates, standard errors, and test-statistics when ordinal indicators are used (i.e., Likert Scales) (Flora & Curran, 2004).

Items were removed in the instance where there was cross-loading (i.e., loading $B = >0.30$ on more than one factor) and where modification indices produced in Mplus (version 7.4) suggested removal of items to improve model fit. All items with a factor loading of $B = >0.4$ were retained. In the instance where existing scales were used to measure a performance-related construct, data were subject to confirmatory factor analysis (CFA), to test the effectiveness in measuring the latent construct of performance, again using a WLSMV estimator (Schmitt & Sass 2018; Thompson, 2004).

Model fit was assessed following standard recommendations, whereby a non-significant chi-square indicates good model fit to degrees of freedom ratio ($X^2: df$) of $< 3:1$; Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) values $>.90$ indicating acceptable fit, and values $>.95$ indicating good model fit, Root-Mean-Square Error of Approximation (RMSEA) of $<.08$ indicating acceptable fit and values $<.05$ indicative of good model fit (Perry et al., 2015).

3.3 Ethical Considerations

3.3.1 Ethical approval and permissions

Ethical approval for the study was obtained from the HPM-CGH Research Ethics Committee at Trinity College Dublin, as well as from the National Research Health Ethics Committee at the Federal Ministry of Health, Sudan (Copies of the Letters of Approval from the two separate committees are presented in (Annex 1). Participant information leaflets and informed consent forms were made available in both Arabic and English languages, depending on the preference of the potential participant.

All potential participants were initially informed of the study via phone, email, and/or in-person and were either sent or handed a copy of the participant information leaflet. The participant information leaflet (provided in both Arabic and English language) explained all potential risks and discomforts, participants' full rights to discontinue the study at any time, and were allowed to ask questions. Each potential participant was given a week to consider their participation in the study. After a week, potential participants were once again contacted to see if they were still interested in participating in the study. If they were still interested, and the participant agreed to join the study, he/she were either:

1. Invited to attend the workshop at the host institute, SMSB
2. Met on the date, time and location of most convenience to them for the key informant interview
3. Invited to attend the focus group discussion at PHC facility (Director's office)
4. Invited to attend their PHC on a particular date and time to complete the questionnaire

Participants were allowed to ask any questions before seeking written consent.

3.3.2 Informed consent

Consent procedures were consistent with international standards, and all reasonable steps were taken to ensure that participants could collaborate freely and without coercion, as detailed below. Informed consent was obtained verbally and in writing from participants. Participants being interviewed were informed that the interview was being recorded after given the option to opt not to. Participants

were also informed of how any potential identifiers (job titles, locations) would be managed and anonymised during the transcription phase. The extent to which confidentiality and anonymity are guaranteed is further detailed below. Participants were made aware that they could contact me should they have any questions or concerns. I further explained that participation was voluntary, and as participants, they had a right to withdraw at any time and that their decision to not participate would affect their involvement in the CMW programme. Also, the following steps were taken to protect:

a) Participant identities

The participant's identity was carefully considered, and the only documents that contained the participant's personal information (i.e., name, address, and telephone number) were the consent forms. The consent forms were kept under lock and key in a secure location at the Sudanese Medical Specialisation Board. All participants were given a randomly assigned unique participant ID at the commencement of the study. The only document containing both the participant name and the corresponding identity code was kept on a password-protected document, under a password protected computer terminal, which only I had access too. It was not permitted to transfer data from one computer terminal to another (i.e., via email or USB).

b) Data collected

An identity code was generated for each participant, and any personal identifying information was removed from the raw data, including interview transcripts. All transcripts were kept in a password-protected document, under a password protected computer terminal, with access restricted only to myself. The identification key was stored securely and separately from the primary data. Only I had access to the raw data.

c) Hardcopy records

Documents containing personal information were stored in a locked cabinet, to be stored for five years after the study has been completed, with access strictly restricted to myself. After five years, the data will be destroyed according to the guidelines set forth by the Data Protection Commissioner of Ireland.

d) Softcopy records

All computerised data/information was encrypted and stored on a password-protected computer terminal, on a password-protected document, which only I had access to.

3.3.3 Risk management

Although no unforeseeable risks, discomforts, or research-related injury were identified, I took reasonable steps to assess and mitigate any risks to those participating in the research. Participation in the study was entirely voluntary, and refusal to participate did not involve any penalty or loss of benefits to which participants were entitled. FGD participants were reassured that their contributions were confidential and not shared with anyone and therefore, would not affect the quality of care received at the PHC facility. Participants reserved the right to discontinue at any time without having to give a reason, and without any penalty or loss of benefits to which participants were otherwise entitled. I provided free Helping Baby Breathe (HBB) training to the community midwives and corrected any technical information after the tool administration process.

3.4 Quality Assurance

Quality assurance was maintained in the different stages of the mixed-method design where several trustworthiness strategies were applied (Shenton, 2004). The first stage of the exploratory phase, consisted of the systematic literature assessing maternal health workers' performance in LMICs. Quality assurance procedures set forth as PRISMA/EPPI Centre were applied. Furthermore, to ensure reliable, evidence-based studies and to assess the risk of bias in included studies, review authors independently conducted quality assessment using Standard quality assessment criteria for evaluating primary research papers (QualSyst) (see 3.2.1.1.2 Data Analysis and Quality Assessment).

In addition to the systematic literature review, the exploratory phase consisted of an extensive desk review of key policy documents, as presented in Chapter 2, enhancing credibility (Erlandson, et al., 1993; Shenton, 2004). Furthermore, it involved extensive consultation with various stakeholders to understand better the context of the reproductive health system in Sudan and the perception of key stakeholders on maternal health provider performance.

To allow triangulation, obtaining the data through multiple stakeholders, i.e. data triangulation by applying multiple approaches and tools, i.e. method triangulation (Carter, et al, 2013; Patton, 1999; Polit & Beck, 2012), as 13 key informant interviews, a series of participatory IR workshops, and focus group discussions with RH State Coordinators, CMWs and beneficiaries. Methods such as role-plays with CMWs were conducted to further build rapport and trust. The second phase of the study, tool development phase, applied similar measures through the participatory consultative approaches, as IR workshops and CMW expert group. Phase three of the study, the tool testing phase, was piloted by the use of cognitive testing's four areas for evaluating responses: comprehension, retrieval, judgement, response (Tourangeau, 1984). While, with the CMWs in phase three, the researcher stayed in the study area for the duration, lived and ate with the CMWs to build rapport allowing familiarity with the culture of participants. Furthermore, introduced as a researcher and not a former MoH employee, the researcher did not collect the full-names of the CMWs, nor their duty-station to build trust. The systematic, periodic rigorous consultation, frequent debriefing sessions and variety of participants involved allowed for the thick, rich data to be generated, fed-back to the respondents for further consultation and member-check and data saturation to be reached (Bowen, 2008; Fusch and Ness, 2015; Kerr, Nixon, & Wild, 2010; O'Reilly & Parker, 2012; Shenton, 2004 ;Walker, 2012).

In measuring performance, different approaches as the 360 degree approach would have been applied in developing the practical measure of performance that captures input from CMW's, supervisors, colleagues, and, possibly, beneficiaries (Carlson, 1998; Carson M., 2006). However, due to the study being bound by a time-frame, instability of situation in the study sites, unemployed CMWs by the health system in many instances (lack of organisational link and accountability), to name a few it was not feasible. Also, key performance indicators (KPI) would have been an approach, as were the performance appraisal, however, in the study area- Sudan and among the newly developed CMW that would not have been possible, due to the weak human resource management system and inexistence of such. Therefore the mixed-method design was applied, tailored into phases and tools developed, contextualised and tested.

3.5 Reflexivity

Mason (1996) states that “reflexive research means that the researcher should constantly take stock of their actions and their role in the research process and subject these to the same critical scrutiny as the rest of their data.” (p. 6). To further ensure rigour, I applied reflexivity (Rice & Ezzy, 1999; Finlay, 1998; Guillemin & Gillam, 2004; Harrington, 1998), while acknowledging the four commonly used reflexive strategies in qualitative research (i) reflexivity as recognition of self; (ii) reflexivity as recognition of other; and (iii) reflexivity as truth. Hertz (1997, p. viii) notes that the reflexive researcher does not merely report the “facts” of the research but also actively constructs interpretations (“What do I know?”), while at the same time questioning how those interpretations came about (“How do I know what I know?”)(Hertz, 1997; Pillow, 2003). I was stationed in a host institute in Sudan, the Sudan Medical Specialisation Board (SMSB). The host institute provided a desk with a phone and access to a meeting room. I am fluent in both Arabic and English.

Reflexivity as recognition of self (Researcher know thyself): As a female public health specialist working in the health system - first as an intern practitioner, and then as a specialist for over a decade, I have come to a better understanding of how the health system functions and the problems and bottlenecks it faces in planning, implementation, and evaluation. For the five years before pursuing this area of study as my Ph.D., I was the focal point for research and publications, and monitoring and evaluation (M&E) officer at the National Human resources for health Observatory (NHRHO) in Sudan, hosted by the Human Resources Development Directorate (HRDD) of the Federal Ministry of Health (FMoH), one of NHRHO's 30 identified national HRH stakeholders.

The insider perspective I had was critical to the research. The strengths demonstrated in the ability to involve the variety of stakeholders and participants in the restrictive duration of the study and geo-political climate of the country. Policy makers and senior officials were were my key informants, that participated in the different phases of the study and were available, open, pro-active and trustful that the information provided was to be put in good use. The buy-in of the FMoH and international organization allowed me the opportunity (time and venue) to conduct IR workshops and FGDs with the RH state coordinators during

their annual meeting, CMWs and beneficiaries. Also, the ability to mobilise the CMWs from two different states and their respective localities, through full commitment at federal and state level of HRH directors, RH state coordinators, directors of the midwifery schools, was made possible. Full accommodation, transportation, training and renewal of their midwifery kits was facilitated by the former and expenses covered by myself. No doubt, given my location limitations within the existing power relations and the potential alignment with the perspectives of some stakeholders over others' was observed in some instance during data collection, but, were minimised as mentioned in the section above.

“What do I know?” As the country of study faces HRH challenges, I led the update of the national HRH research priority list through a national exercise. One of the priority areas identified for research was HRH performance, which was further highlighted through national strategy documents including the national health sector strategy, the national HRH strategy, and internationally, in the global health workforce strategy: 2030. This experience is what triggered my interest in performance and helped me identify practical means to measure the performance of CMWs as part of this study.

Reflexivity as recognition of others: The choice of the study population (i.e., CMWs) came as a result of my observation and discussions during this cadre's creation and training. As mentioned, I was based at the HRDD, which produced this cadre, through one of its sub-directorates, the Academy of Health Sciences (AHS). I was intensively engaged in activities held as part of the AHS' mandate in training health cadres throughout the continuum of care, from consultants to mid-level and frontline health workers at central and state levels. Therefore, I was aware of the process that led to this cadre's development. Secondly, I strongly believe in IR's fundamental principles and its use in generating evidence for optimal health service quality. The stakeholder engagement, continuous consultative process, co-development of the tool/scale, and share of results throughout the study-captures their essence and allowed them to speak for themselves. Therefore, implementation research features heavily as the method of inquiry in the current study.

Reflexivity as truth: As mentioned, I worked for the FMoH for over a decade, and therefore have a better understanding of the context, the health system, and

how it operates. Equally, I was involved and led national surveys, adapted data collection tools, developed and trained health workers, and participated in policy as well as strategy development. Therefore, I felt comfortable designing, developing, and conducting the study in Sudan in a participatory way that contextualises tools. Throughout the process, I would go back to the HS stakeholders and expert group share findings and check that what is developed and my understanding of what is said is the truth- trying to get it right, i.e., validating them. I also followed the official channels for the tool to be nationally endorsed by the General Directorate of Primary Health Care-Maternal and Child Health Directorate of the Sudan Federal Ministry of Health.

Overall, reflexivity has been useful for supporting data collection and analysis, providing depth in interviews and workshops, and enhancing the quality and trustworthiness of this research.

4 Chapter Four Measurement of Performance of Maternal Health Workers in Low and Middle-Income Countries: A Systematic Review

Introduction

This chapter presents the results of the systematic literature review conducted as part of the exploratory phase to determine what factor(s) constitute 'performance' among maternal health workers in LMICs. Specifically, the systematic review asked: What are the common factors used to measure maternal health workers' performance in low and middle-income countries? What constructs are used in LMICs in the measure of performance, how these are measured, and what tools, if any, exist in the measurement of performance were all extracted. Results of the systematic review were used to develop an initial theoretical model of health worker performance. This initial model is then carried forward in the subsequent phases of the thesis for further refinement through consultations with key informants and CMWs, addressing the first objective of the thesis.

The search identified **4,636** titles from 2006 to August 2017. After screening for duplicates, **2,413** titles were selected for the title and abstract reading. From these, a total of **447** articles were selected for full-text screening. A total of **329** articles were excluded leaving **118** articles for data extraction. This was followed by a quality assessment check that left **83** studies in total to be included in the analysis. The PRISMA chart below summarises the process.

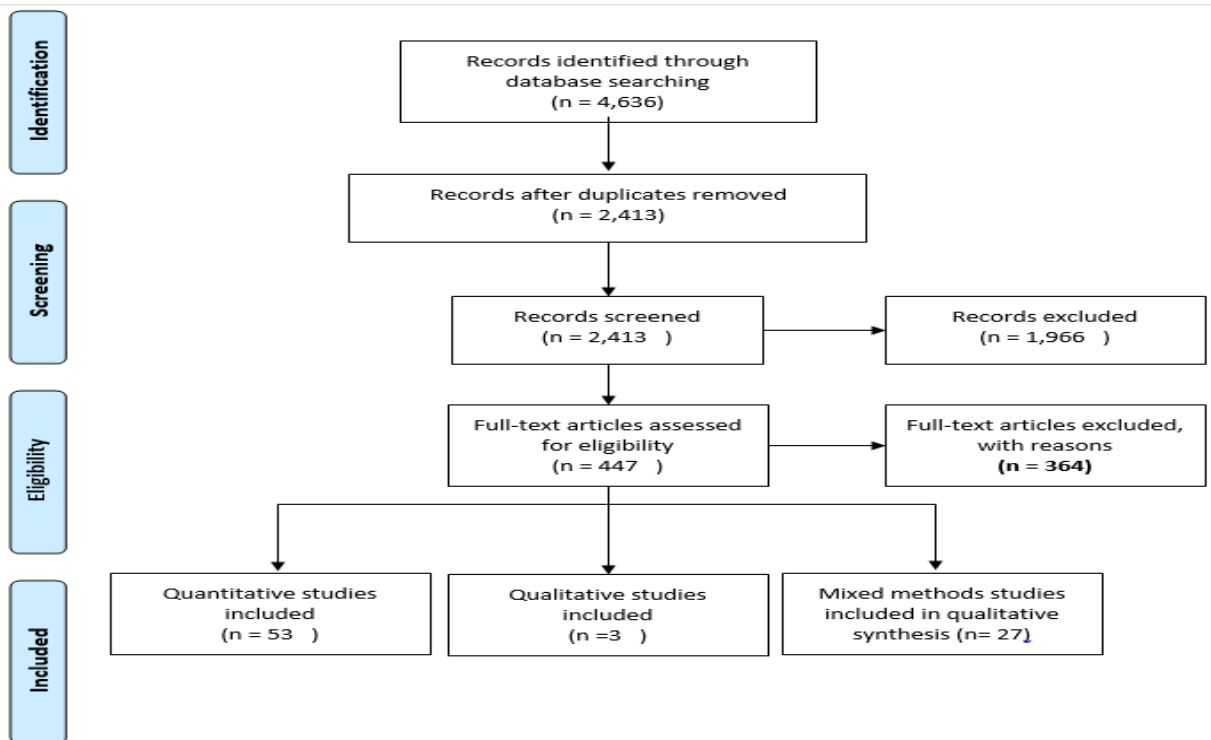


Figure 10 PRISMA chart

4.1 Study characteristics

Out of the 83 studies, 33 were conducted in low-income countries, 13 in upper-middle-income countries, and 37 in middle-income countries. Forty-six studies were published between the years 2006-2014, with a peak of 20 studies published in the year 2015, corresponding with the end of the MDGs. By comparison, none were published in 2006, when the World Health Report entitled 'Working Together for Health' was initially published.

The majority of studies ($n = 43$) were of quantitative design, ($n=25$) applied a mixed-method approach, and ($n=15$) employed qualitative methods. Quantitative approaches were favoured to measure the performance-related factors of quality of care ($n = 8$), knowledge ($n = 17$), and skills ($n = 10$). Performance measurement tools ranged from surveys, questionnaires, scales, and pre and post-tests, practical assessment, written tests, or multiple-choice questionnaires (MCQs). The type of cadres under study ranged from nurses to auxiliary/nurse/community/public health midwives, lady health workers/visitors, clinical officers, assistant medical officers, township health workers, village doctors, community health workers, and health extension workers. Years of training ranged from 5-days to 4 years.

The description of tasks across studies ranged from MNCH health promotion, prevention, and curative care. Tasks ranged from providing family planning services, antenatal care, postnatal care, and child immunisation, to labour, essential and emergency obstetric and newborn care (EmONC), and abortion/post-abortion care, in addition to HIV/AIDS service provision. This wide range is reflective of task-shifting and task-sharing approaches, consistent with global attempts to produce a more significant number of RMNCH cadres, in a short period, to address global maternal and child health care deficits. Most studies sampled midwives (n=26), followed by nurses (n=10) and nurse midwives (n=8). Table A2 (Annex 7) illustrates the diversity of different maternal health providers across the various studies, with a brief job description of each cadre, where available.

4.2 Performance constructs measured

A total of 16 performance-related constructs were reported and measured across the 83 studies. These included quality of care, knowledge, skills, competency, compliance, self-efficacy, self-confidence, burnout, motivation, productivity, job satisfaction, patient satisfaction, workload, occupational stress, organisational justice, and workplace behaviour. The majority of studies (n = 26) measured 'quality of care' as the principal measure of performance. Health worker 'knowledge' (n = 24), skills (n = 17), 'competency' (n = 7), 'job satisfaction' (n = 7), 'compliance' (n = 3) and 'motivation' (n = 4) also featured among the most commonly measured components of performance. Table (25) summarises the different performance-related constructs measured across the 83 articles, followed by a discussion of each construct in the context of the existing literature.

The knowledge and skills of maternal health worker measures in studies is described as performance, as is the case when assessing auxiliary nurse midwife performance through a post-training test on helping baby breathe (HBB) (Goudar et al., 2013). Similarly, when measuring the knowledge and skills of skilled birth attendants on emergency obstetrical and neonatal care (EmONC) based on the maternal death and disability model assessment (Partamin et al., 2012).

The quality of care assessment is also described as performance measures in other studies as is the case when measuring the quality of antenatal care services availed by healthcare providers based on national and world health organisation guidelines on antenatal care (Manithip et al., 2013a), furthermore, lot quality assurance sampling to measure performance of community health workers in rural Zambia (Mwanza et al., 2017). Additionally, the standard-based approach to quality improvement was encountered as a measure of performance (Kols et al., 2015), as was the standards-based management and recognition (SBM-R) (Y. M. Kim et al., 2013).

Table 25 Performance-related constructs articles

o.	Construct measured	N	Articles
1	Quality of care	26	(Agha, 2010; Aung et al., 2015; Brenner et al., 2015; Chandhiok et al., 2015; Chen et al., 2014; Diedhiou et al., 2015; Dumont et al., 2013; Duysburgh et al., 2016; Duysburgh et al., 2013; Ejigu, Woldie, & Kifle, 2013; Engineer et al., 2016; Fakhri et al., 2016; Gross, Armstrong Schellenberg, Kessy, Pfeiffer, & Obrist, 2011; Jennings, Yebadokpo, Affo, & Agbogbe, 2010; Kambala et al., 2017; Young Mi Kim, Maureen Chilla, et al., 2013; Nesbitt et al., 2013; Nikiema, Kameli, Capon, Sondo, & Martin-Prével, 2010; Pembe et al., 2010; Pitchforth et al., 2010; Rabbani, Pradhan, Zaidi, Azam, & Yousuf, 2015; Tetui et al., 2012; Vivio et al., 2010; D. Walker, DeMaria, Suarez, & Cragin, 2012b; Walton et al., 2016; Warren, Mwangi, Oweya, Kamunya, & Koskei, 2010).
2	Knowledge	24	<p>4 instances measuring it alone (Young Mi Kim, Nasratullah Ansari, Adrienne Kols, Hannah Tappis, Sheena Currie, Partamin Zainullah, Patricia Bailey, Richard Semba, et al., 2013; Ohnishi, Nakamura, & Takano, 2007; Pitter, 2016b; Sibley et al., 2014), 1 time with performance (Partamin et al., 2012)</p> <p>but the rest in conjunction with other constructs namely Skills 13 times (Andreatta, Gans-Larty, Debpuur, Ofosu, & Perosky, 2011; Ansari, Zainullah, Kim, Tappis, Kols, Currie, Haver, van Roosmalen, Broerse, Stekelenburg, et al., 2015; Bang et al., 2016; Canchihuaman, Garcia, Gloyd, & Holmes, 2011; Waldemar A. Carlo et al., 2009; C. L. Evans et al., 2014; Gobezayehu et al., 2014; Goudar et al., 2013; Grady et al., 2011; Lakhani et al., 2016; Mirkuzie, Sisay, & Bedane, 2014; Mirkuzie, Sisay, Reta, & Bedane, 2014; Rabbani et al., 2015; Sotunsa et al., 2016)</p> <p>2 times with competency (Young Mi Kim, Nasratullah Ansari, Adrienne Kols, Hannah Tappis, Sheena Currie, Partamin Zainullah, Patricia Bailey, Jos van Roosmalen, et al., 2013; Sheikh et al., 2016)</p> <p>2 studies with self-confidence (Jayatilleke et al., 2015; M. E. Kruk et al., 2016)</p> <p>2 self-efficacy (Ramadurg et al., 2016; D. M. Walker et al., 2015)</p> <p>1 time practice (Ratcliffe et al., 2016)</p>
3	Skills	17	<p>13 studies in conjunction with other constructs namely Knowledge (Andreatta et al., 2011; Ansari, Zainullah, Kim, Tappis, Kols, Currie, Haver, van Roosmalen, Broerse, Stekelenburg, et al., 2015; Bang et al., 2016; Canchihuaman et al., 2011; Waldemar A. Carlo et al., 2009; C. L. Evans et al., 2014; Gobezayehu et al., 2014; Goudar et al., 2013; Grady et al., 2011; Lakhani et al., 2016; Mirkuzie, Sisay, & Bedane, 2014; Mirkuzie, Sisay, Reta, et al., 2014; Sotunsa et al., 2016; Walton et al., 2016)</p> <p>1 with quality (Walton et al., 2016)</p> <p>1 workload with skills (Smit, Bitzer, Boshoff, & Steyn, 2009)</p> <p>2 studies measuring it alone (Conroy et al., 2015; Nyango, Mutihir, Laabes, Kigbu, & Buba, 2010)</p>
4	Competency	7	<p>2 in conjunction with other construct namely Knowledge (Young Mi Kim, Nasratullah Ansari, Adrienne Kols, Hannah Tappis, Sheena Currie, Partamin Zainullah, Patricia Bailey, Jos van Roosmalen, et al., 2013; Sheikh et al., 2016)</p> <p>5 instances measuring it alone (Aragaw, Yigzaw, Tetemke, & G/Amlak, 2015; Chaturvedi, Upadhyay, & De Costa, 2014; Kildea, Larsson, & Govind, 2012; Traoré et al., 2014; Zhang, Ye, & Fan, 2015)</p>
5	Compliance	3	(Conrad et al., 2012; Kabo et al., 2016; Pitchforth et al., 2010).
6	Performance	7	(Goudar et al., 2013; Manithip, Edin, Sihavong, Wahlström, & Wessel, 2013; Mwanza et al., 2017; Partamin et al., 2012; Saber, Arbabisarjou, & Kianian, 2016) 2 studies measured performance with working conditions (Y. M. Kim et al., 2013; Kols et al., 2015)
7	Self-efficacy	3	(Waldemar A. Carlo et al., 2009; Olson et al., 2015; Ramadurg et al., 2016; D. M. Walker et al., 2015),

8	Motivation	4	(Chandler, Chonya, Mtei, Reyburn, & Whitty, 2009; Morrison, Batura, Thapa, Basnyat, & Skordis-Worrall, 2015; Nguyen Thi Hoai, Wilson, McDonald, & Thu, 2015; Prytherch et al., 2012),
9	Job Satisfaction	7	(Cagan & Gunay, 2015; Geleto, Baraki, Atomsa, & Dessie, 2015; M. E. Kruk et al., 2016; McAuliffe, Manafa, Maseko, Bowie, & White, 2009; Oncel, Ozer, & Efe, 2007; Rabbani et al., 2015; Sadodin, Daghighan, Esmaily, & Hooshmand, 2016)
10	Patient Satisfaction	7	(Karim, Abdullah, Rahman, & Alam, 2015; Kujawski et al., 2015; Peters, Doctor, Afenyadu, Findley, & Ager, 2014; Tabak & Özmen, 2008; Tetui et al., 2012; Vithana, Hemachandra, Ariyaratne, & Jayawardana, 2013)
11	Self-confidence	2	(Jayatilleke et al., 2015; M. E. Kruk et al., 2016)
12	Burnout	2	(Cagan & Gunay, 2015; Oncel et al., 2007)
13	Productivity	1	(Forcheh & Fako, 2007)
14	Workload	1	(Smit et al., 2009)
15	Occupational stress	1	(Sadodin et al., 2016)
16 & 17	Organisational justice and Workplace behaviour	1	(McAuliffe et al., 2009)

4.2.1 **Quality of care**

Considered an essential component of performance, and on many occasions used interchangeably with performance, quality of care was measured across 26 studies, from both the demand (e.g., the beneficiary) and supply (e.g., the healthcare provider) sides of the health system. Quality of care was measured across different levels of the health system, ranging from community level through to tertiary care, and across different stages of the continuum of care, from antenatal to neonatal, and finally, postnatal care.

How quality of care is defined and measured varies significantly across studies. From the supply side, assessments of the quality of care provided by maternal health workers ranged from evaluations of clinical care and the antenatal care services they provided (Brenner et al., 2015; Gross et al., 2011); the completeness of the ANC consultation process, and scoring of plotting a pantograph by maternal health workers (Chandhiok et al., 2015). Measurement also involved the overall quality of antenatal and childbirth care, focusing on main obstetric complications of obstructed labour, haemorrhage, and hypertensive disorders at the primary health care (PHC) level (Duysburgh et al., 2013); to assessing birth preparedness, danger signs, clean delivery and newborn care (Jennings et al., 2010).

The supply-side predominantly made use of tools as pre- and post-tests or checklists to assess the quality of care objectively as observational assessment (a third party did, i.e., the assessment). A test scoring system was used to evaluate the understanding of plotting pantographs for provided case scenarios to measure the quality of care. The correct recording of foetal heart rate, cervical dilatation, uterine contractions, and maternal condition on the pantograph was given a score of two points each. The correct recording of the woman's identification data and interpretation of the findings was given a score of 1 point each, for a total possible score of 10 points. A total score of 7 or more was considered an adequate understanding of the tool, therefore indicating a good quality of care (Chandhiok et al., 2015).

In another example, observational checklists were used to assess maternal and neonatal risk factors, as process indicators of quality of care (Brenner et al., 2015). Observational checklists were structured using the Standards-Based

Management and Recognition® (SBM-R)—a performance and quality improvement approach, to measure both performance and quality of care, especially among those providing ANC for mothers living with HIV/AIDS and the prevention of mother-to-child transmission (PMTCT) (Young-Mi Kim, Maureen Chilila, et al., 2013; Kols et al., 2015). Aung et al. (2015) measured quality of care objectively as the capacity of the health provider to test, diagnose, and treat endemic diseases like paediatric malaria as assessed by the observed simulated patient. In a final example, the structured observation of antenatal/postnatal and natal care, including birth preparedness, clean delivery, and newborn care as key components of quality of care, was applied to assess the quality of care provided by maternal health workers in LMICs (Jennings et al., 2010; Tetui et al., 2012; D. Walker et al., 2012b; Walton et al., 2016).

In contrast to the more observational measures used to assess the quality of care from the supply side, demand-side assessments predominantly rely on self-reported measures of client satisfaction. Client satisfaction was assessed with regards to antenatal care (Ejigu et al., 2013; Tetui et al., 2012); the quality of emergency obstetric and newborn care (EmONC), with an emphasis on adherence to the WHO's evidence-practice guidelines as a benchmark/gold standard (D. Walker, DeMaria, Suarez, & Cragin, 2012a); and postnatal care. For postnatal care, quality of care was defined as health care within 42 days after delivery, postnatal home visits, and postnatal care in health care facilities, and was assessed through a maternal, newborn and child health household survey. The survey asked beneficiaries about coverage and quality of care of the maternal health worker's services with regards to checking the newborn's umbilical cord, assessing the newborn's temperature, observation of and counselling for breastfeeding, counselling on newborn danger signs, weighing the baby, and checking for jaundice (Chen et al., 2014).

Quality of care was also assessed at both supply and demand sides as adherence to family planning, measured by maternal experiences using an end-line survey, and by employing a pre- and post-test survey to assess changes in health provider knowledge (Diedhiou et al., 2015). While the interviews conducted as part of studies measuring the quality of care from the demand-side varied from the key informant to exit-satisfaction interviews, they generally followed an open-ended, semi-structured pattern (Duysburgh et al., 2016;

Duysburgh et al., 2013; Ejigu et al., 2013; Engineer et al., 2016; Fakhri et al., 2016; Gross et al., 2011; Kambala et al., 2017; Nesbitt et al., 2013; Pembe et al., 2010; Vivio et al., 2010). Others assessed the client-provider interactions by observation checklist (Warren et al., 2010). Quality of care assessments was also based on national and WHO guidelines on antenatal care (Manithip et al., 2013).

In summary, quality of care was the most frequently cited factor in the measure of performance. Quality of care tends to be assessed through one of two types of samples, representing the supply-side (i.e., health workers) or the demand-side (i.e., clients, beneficiaries, or those in receipt of care). Whereas the former tends to be assessed through more objective measures (i.e., observational measures by a third party), the latter tends to be assessed through more subjective, self-reported measures, with few studies (n=4) capturing elements of both.

4.2.2 Knowledge

Knowledge was measured as a component of performance in 24 studies, with the majority of studies using tests taken by the health workers themselves as the principal method of knowledge assessment (Goudar et al., 2013; Lakhani et al., 2016; Mirkuzie, Sisay, & Bedane, 2014). Testing seems to be the most common way to assess knowledge – and knowledge was either found to be synonymous with performance (i.e., knowledge as the sole factor of performance) or knowledge was assessed along with other factors (i.e., self-confidence, skills, etc.). Some studies (n=5) equated knowledge with performance and therefore measured knowledge as a single measure of performance. In these cases, the performance was assessed through knowledge of basic antenatal care (ANC) functions, such as calculating the expected date of delivery, measuring uterine fundus, assessing foetal lie and presentation, and identifying danger signs associated with ante/natal and postnatal period (Ohnishi et al., 2007). Others, such as Pitter (2016), assessed the performance of ANC among midwives in public maternity hospitals by knowing how to mitigate intergenerational violence among women who experienced gender-based violence (Pitter, 2016a). Others, such as Sibley and colleagues (2014), measured maternal health workers' performance through clinical skills assessments and baseline/end line surveys (Sibley et al., 2014).

Across studies, both knowledge and skills of skilled birth attendants were assessed (n= 12) as a measure of performance, depending on the type of maternal health care provider's training programme and job description (RMNCH). Grady et al. (2011), for example, assessed participants' pre- and post-knowledge, and skills across the key topics of maternal and new-born resuscitation, shock and the unconscious patient, eclampsia and severe pre-eclampsia, communication and triage, obstetric emergencies, haemorrhage, obstructed labour, sepsis and abortion complications. A pre and post-multiple-choice questionnaire (MCQs) was also used to evaluate the effect of the helping baby breathe (HBB) training on neonatal resuscitation skills and knowledge (Bang et al., 2016). Similarly, pre and post-tests were used to evaluate the impact of a simulation-based training programme on the abilities of skilled birth attendants (SBA) (Andreatta et al., 2011), with a time variation of the post-test ranging from immediately to four months after completion of the course (Canchihuaman et al., 2011). In other instances, knowledge was assessed in terms of post-abortion care among midwives (Ansari et al., 2015).

Assessment tools such as pre and post-written tests were also used to assess the knowledge, skills, and self-efficacy of maternal health workers (Waldemar A. Carlo et al., 2009). Furthermore, pre- and post-knowledge was assessed, alongside self-confidence, among public health midwives to recognise and manage intimate partner violence after training (Jayatilleke et al., 2015). Apart from tests, focus group discussions, and in-depth/semi-structured interviews were also used to measure maternal health workers' knowledge and skills, alongside patient satisfaction (Sotunsa et al., 2016).

In summary, knowledge was the second most frequently cited factor in the measure of performance. Knowledge tends to be assessed as a single component measure of performance (n=5) or in combination with skills (n=12), or other constructs.

4.2.3 Skills

Skills, as a component of performance, were assessed in 17 studies. In two instances, skills were the sole measure of performance (Conroy et al., 2015; Nyango et al., 2010). Skills were most often measured in conjunction with knowledge (Andreatta et al., 2011; Ansari et al., 2015; Bang et al., 2016;

Canchihuaman et al., 2011; Waldemar A. Carlo et al., 2009; C. L. Evans et al., 2014; Gobezaayehu et al., 2014; Goudar et al., 2013; Grady et al., 2011; Lakhani et al., 2016; Mirkuzie, Sisay, & Bedane, 2014; Mirkuzie, Sisay, Reta, et al., 2014; Sotunsa et al., 2016; Walton et al., 2016). In one study, skills were measured alongside workload (Smit et al., 2009), and in another with quality of care (Walton et al., 2016). Maternal health worker performance was described as knowledge and skills, assessed through a post-training test on helping baby breathe (HBB) (Goudar et al., 2013). Similarly, when measuring the performance of skilled birth attendants, Partamin et al. (2012) assessed knowledge and skills on emergency obstetrical and neonatal care (EmONC), based on maternal death and disability (Partamin et al., 2012).

In another study, 'skills' was considered a health care worker's ability to retain what they had learned after neonatal resuscitation training (Conroy et al., 2015). Skills were primarily assessed using case-scenarios, whereby practical skills, such as resuscitation, are assessed using a neonatal manikin, scored out of 10, based on completing a series of steps in the resuscitation process. Assessments are conducted immediately upon completion of a course and again three months later. Nurse midwives' skills in delivering emergency obstetrical care were also assessed (Nyango et al., 2010).

4.2.4 Competency

Though sometimes used interchangeably with knowledge (Traoré et al., 2014), competency is defined as the ability to apply knowledge in concrete situations, whereby knowledge attainment leads to improved performance (Chaturvedi et al., 2014). Competency, as a component of performance, was measured in seven studies. In five instances, competency was measured as the sole indicator of performance (Aragaw et al., 2015; Chaturvedi et al., 2014; Kildea et al., 2012; Traoré et al., 2014; Zhang et al., 2015). In the remaining two studies, competency was measured in conjunction with another construct, namely knowledge (Young Mi Kim et al., 2013; Sheikh et al., 2016). Methods used to assess competency ranged from testing, case-vignettes, observational methods, and qualitative approaches.

Kildea et al., (2012) based their measure of competency on the international confederation of midwifery's (ICM) guidelines on essential core

competencies to reduce maternal and infant mortality and morbidity through a midwife self-assessment tool. Traoré et al. (2014) assessed competency through a knowledge test administered to obstetric nurses and midwives, providing emergency obstetrical care. Initial assessment, diagnosis, and decision-making of first-line treatment in the form of case-vignettes were applied by Chaturvedi et al. (2014), and, using a qualitative approach, they measured competency of the maternal health worker based on her response to the 3-4 open-ended questions provided.

Observed simulated patient (OSP) was also applied to assess the health providers' capacity to test, diagnose, and then treat paediatric malaria (Aung et al., 2015). The OSP method requires that a researcher trained as an actress play the role of a mother, using a doll of approximately the same size and weight of a 5-year-old male child. The provider is asked to examine and propose treatment for the child and is scored against WHO-derived best practices for the diagnosis and treatment of non-severe paediatric malaria. Other aspects of competency assessed by Aragaw and colleagues, included an institutional based maternal health care providers cultural competency, applying a modified Campinha questionnaire to health workers, defined as "an educative process that involves developing self-awareness, learning to appreciate difference, valuing cultural practices other than one's own, and acting flexibly in ways that accommodate these values" in addition to a semi-structured guide on mothers (Aragaw et al., 2015; Campinha-Bacote, 2003). Lastly, initial assessment, diagnosis, and decision-making of first-line treatment in the form of case-vignettes were applied by scholars using a qualitative approach to measure competency (Chaturvedi et al., 2014).

4.2.5 Compliance

Maternal health provider's compliance was also considered a component of performance in some studies (n=3) (Conrad et al., 2012; Kabo et al., 2016; Pitchforth et al., 2010). The observation was the most common method through which to assess compliance. A multi-country study in Burkina-Faso, Uganda, and Tanzania considered performance measurable through health worker compliance to antenatal care services, as measured by a third party's systematic observation using a pre-defined checklist to assess health workers' compliance to ANC procedures (Conrad et al., 2012). Another study assessed compliance by

monitoring health workers' interactions with clients (Kabo et al., 2016). Pitchforth and colleagues (2010), assessed the quality of care and compliance of the maternal health worker through observation during labour, delivery, admissions, and routine care (Pitchforth et al., 2010).

4.2.6 **Self-efficacy**

Self-efficacy was measured as a component of performance in three studies and was most commonly assessed alongside knowledge (Waldemar A. Carlo et al., 2009; Olson et al., 2015; Ramadurg et al., 2016; D. M. Walker et al., 2015). Walker and colleagues (2015) described self-efficacy as confidence in their ability to perform critical skills. Therefore, performance is considered more than just possessing skills or knowledge, but also having the confidence to know that one can appropriately apply these to achieve a desirable outcome.

Self-efficacy was most often measured as a self-reported pre-and post-training survey, using scales of 0–100, completed by obstetric and neonatal care-providers, mostly nurses. As measured by Walker and colleagues, self-efficacy was rooted in Bandura's model of self-efficacy, which views perceived self-efficacy as concerned with people's beliefs in their capabilities to produce given attainments (Bandura, 1977; D. M. Walker et al., 2015). Ramadurg (2016), measured self-efficacy levels alongside knowledge related to pre-eclampsia among community health workers, auxiliary nurse midwives, accredited social health activists, and staff nurses. Self-efficacy scales were often used alongside other self-report measures, including scales used to measure constructs such as motivation (Prytherch et al., 2012), job satisfaction (Cagan & Gunay, 2015), and burnout (Cagan & Gunay, 2015; Oncel et al., 2007).

4.2.7 **Motivation**

Motivation, whether intrinsic or extrinsic, identified as a determinant and or outcome of the performance, was measured in four studies. Scholars recognise that organisational and individual factors influence ones' motivation, therefore affecting performance positively or negatively (Chandler et al., 2009; Morrison et al., 2015; Nguyen Thi Hoai et al., 2015; Prytherch et al., 2012). Described as "an individual's degree of willingness to exert and maintain an effort towards organisational goals" (Franco, 2002), motivation was most often measured by adapting existing validated tools, such as the 23-item motivation scale developed

by Mbindyo,(Mbindyo PM, 2009). The motivation was also measured through qualitative means, where Morrison and colleagues conducted semi-structured interviews with maternal health workers, asking them to describe their own and colleagues' motivation and explain its determinants (Morrison et al., 2015; Nguyen Thi Hoai et al., 2015).

In their study conducted with non-physician clinicians in Tanzania, Chandler et al. (2009) measured what influences motivation, to capture 'internal' and 'environmental' motivation factors, using 37 items from Penn-Kekana et al.'s (2005) study. They also used 15 of the more consistent item statements from Bennett et al.'s (2001) tool, and ten items developed from the results of the qualitative study. Environmental factors included items measuring job security, salary, resource availability, and risk from patients, organisational justice, and management support and policy environment. On the other hand, internal motivation factors included job satisfaction, organisational commitment, intention to leave, attitudes towards patients, self-efficacy, work ethic, vocation, and attitude to change.

Prytherch et al. (2012), measured the understanding and influences of motivation through a socio-culturally developed interview guide. They described motivation as a determinant of performance, whereby enhancing provider motivation improves performance (Prytherch et al., 2012).

4.2.8 Job Satisfaction

Job satisfaction, framed as a determinant of performance, was measured in seven studies. Job satisfaction was defined as "a positive emotional state resulting from a person's appreciation of his/her work or experience and reflected an interest in job/ experience"(Locke, 1976, p 1300). Across studies, the role of job satisfaction was discussed in terms of its impact on the quality of health services, its direct relationship to the performance of health workers, and how job satisfaction can improve productivity and performance of healthcare providers (Cagan & Gunay, 2015; Geleto et al., 2015; M. E. Kruk et al., 2016; McAuliffe et al., 2009; Oncel et al., 2007; Rabbani et al., 2015; Sadodin et al., 2016). The levels of job satisfaction of the health workforce were recognised as determined by several interrelated factors. These factors can have positive or negative effects, including working conditions, remuneration/pay, access to needed supplies, professional

autonomy, supervision, working hours, workplace safety, career structures, and access to professional development opportunities (Geleto et al., 2015).

Job satisfaction was assessed using a translated and modified version of the Minnesota Job Satisfaction Scale ((Weiss, Dawis & England, 1967; Cagan & Gunay, 2015; Oncel et al., 2007). Other measures of job satisfaction included adaptations of the Wellness Council of America and the Best Companies Group scale (Richards, 2011). The latter differentiated job satisfaction into 36 items divided into eight main domains: leadership and planning, institutional culture and communication, employee's role, pay and benefit, work environment, training and development, and relationship with supervisor and co-worker relationship. Each domain has satisfaction with its subsidiary scales, which were measured using a Likert scale (Geleto et al., 2015).

Job satisfaction among maternal health providers performing tasks traditionally undertaken by doctors and registered nurses (i.e., task shifting) was also assessed in Malawi using focus group discussions and interviews (McAuliffe et al., 2009). Lady health workers' job satisfaction was assessed with knowledge and quality of care through a validated 'service provision assessment toolkit', developed in Pakistan (Rabbani et al., 2015).

4.2.9 Patient Satisfaction

Patient satisfaction is a subjective and dynamic perception of the extent to which expected health care is received. To improve performance, quality ,and efficiency of health care during childbirth, many scholars follow the World Health Organisation recommendation to monitor and evaluate maternal satisfaction.

Patient satisfaction was often used to measure the health system's expectations and as a subjective rating of the patient experience. Patient satisfaction was measured in seven studies and mainly assessed subjectively from the perspective of the patient or beneficiary group using a range of methods, ranging from structured questionnaires to, more qualitative, semi-structured interviews and focus group discussions (Bitew, Ayichiluhm, & Yimam, 2015; Karim et al., 2015; Kujawski et al., 2015; Peters et al., 2014; Tabak & Özmen, 2008; Tetui et al., 2012; Vithana et al., 2013). Patient satisfaction was measured separately and in combination with the quality of care, whereby measuring the health facilities' capacity to deliver ANC services, was defined as the completeness of the ANC

consultation process and patient satisfaction with ANC services offered, as assessed through structured exit interviews (Tetui et al., 2012).

Patient satisfaction was measured by Bitew et al. (2015) using structured questionnaires, containing 19 questions adopted from the Donabedian(2005) quality assessment framework, including the cleanliness of the examination area, toilets, facility and waiting area; waiting time, courtesy and respect; the distance of facility; service fees and confidentiality and trust in providers. Focus group discussions and in-depth/semi-structured interviews were also used with patients to measure their satisfaction. Patient satisfaction was measured through the quality of care interviews and questionnaires for the disrespectful and abusive treatment during labour and delivery, created and validated for the Tanzanian study context (Kujawski et al., 2015a).

In another study, patient satisfaction was described as the expectations and actual experiences of pregnant women regarding the communication skills and practices of health staff (Tabak & Özmen, 2008). The authors of the study applied a framework, which considered the real function of communication in health services to be to ensure the process of convergence, where information is shared by participants to reach a mutual understanding. Here, Tabak and Özmen (2008) also applied the Uludag scale for empathic communication expectations to measure patient satisfaction (A.Uludag, 2001).

4.2.10 Other constructs

Other constructs which were used interchangeably as a determinant or outcome in the measure of performance in LMICs include self-confidence, which was measured in two studies (Jayatilleke et al., 2015; M. E. Kruk et al., 2016); burnout, which was also measured in two studies (Cagan & Gunay, 2015; Oncel et al., 2007); productivity (Forcheh & Fako, 2007); workload (Smit et al., 2009); occupational stress (Sadodin et al., 2016); organisational justice; and workplace behaviour (McAuliffe et al., 2009). Burnout was measured among different cohorts of Turkish midwives and nurses using an adapted and modified version of Maslach's Burnout Inventory (MBI) (Cagan & Gunay, 2015; Maslach C, 1981; Oncel et al., 2007). The MBI is a 22-item scale, measuring three components of burnout: emotional exhaustion (EE), depersonalisation (D), and personal accomplishment (PA). Effective productivity, described as a measure of

performance, was used among a sample of nurses in Botswana (Forchheh & Fako, 2007). The workload was used as a measure of performance to assess nurses' post-training skills on the topic of abortion care following the WHO guidelines (Smit et al., 2009). Sadodin and colleagues measured occupational stress, organisational citizenship behaviour (OCB), and job satisfaction to measure improved healthcare services among midwives and found out that OCB had a significant direct correlation with job satisfaction and an inverse correlation with occupational stress (Sadodin et al., 2016). Organisational justice and workplace behaviour were measured with job satisfaction assessing the disruptive, procedural, and interactional justice among a task-shifting cadre as key determinants of performance (McAuliffe et al., 2009).

4.3 Discussion

This chapter presents the results of the systematic literature review to determine what factor(s) constitute the 'performance' of maternal health workers in LMICs. The systematic review identified 16 constructs commonly used as measures of performance, consistent with idea that performance is a multi-dimensional construct. The constructs most commonly identified as components of performance included quality of care, knowledge, skills, competency, compliance, and self-efficacy. Other constructs, including motivation, supervision, job-satisfaction, burn-out, and work-load, by comparison, were more often referred to as 'impacting' on or 'influencing' performance. Therefore, these latter factors were considered as determinants or factors that predict performance, rather than indicators or components of performance.

The results of the systematic review suggest that a mixture of quantitative, qualitative, and mixed-method approaches are used to measure performance among reproductive, maternal, and child health cadres in LMICs (See Annex 8). Quantitative tools mainly included surveys and questionnaires. Whereby, questionnaires are the set of questions, while, surveys are the set of questions, collection and analyses of responses. Types of surveys included health facility surveys and reviews of records, while the questionnaires were mostly close-ended, structured tools, which, in some instances, are reported as pre-tested tools (i.e., validated/piloted). Questionnaires were used to measure several constructs, including knowledge, clinical-confidence, skills, job satisfaction, patient satisfaction, productivity, and organisational citizenship behaviour. The

questionnaires took different forms, including semi-structured, self-administered skills and knowledge questionnaire, or oral knowledge pre and post test. Questionnaires were mostly based on national guidelines or by adapting and modifying standardised questionnaires to the local context. Scales were typically used to measure constructs such as motivation, job satisfaction, burn-out, and self-efficacy. Surveys were used when measuring the quality of care in the form of maternal, newborn, and child health, household surveys, or baseline and end-line surveys, examining participants' experiences and assessing providers' change in knowledge.

Observational checklists, focus group discussions, in-depth/semi-structured interviews, case-vignettes, and observed simulated patient were among the qualitative tools used alone, and in conjunction with the quantitative tools, in the case of a mixed-method approach. Observational checklists were more commonly applied to measure quality of care. While some assessed the client-patient interaction, others used observational checklists, some of which were structured on the Standards-Based Management and Recognition® (SBM-R). While the interviews varied from key informant to exit-satisfaction interviews, they generally followed an open-ended, semi-structured pattern.

Mixed-method approaches were also adopted to measure constructs such as motivation, where the qualitative interviews were used to define and better understand the context. This first step allowed for the subsequent adaptation, contextualisation, modification, and translation of an existing questionnaire before administering it to the study population (Chandler et al., 2009; Morrison et al., 2015; Thu, Wilson, & McDonald, 2015).

Quality of care, as a component of performance, was measured by test, questionnaires, surveys, and checklists. Knowledge was mostly measured using tests including open ended questions and multiple choice questions (MCQ). Skills were measured using tests, observational checklists, simulation tests, OSCE, MCQs, and questionnaires. Furthermore, competency was measured using case vignettes, interviews, tests, and questionnaires. Compliance was measured by observational checklist and interviews, while self-efficacy was measured quantitatively by questionnaire or scale.

Despite the urgency and importance of improving and enhancing health worker performance to attain universal health coverage in the Sustainable Development Goal (SDG) era, how performance is measured varies significantly within the literature, where no consensus exists. Given the complexity of performance, many countries have opted to enlist a wide-range of maternal health cadres, each fit-for-purpose, and fit-for-practice. The systematic literature review presented here summarises how research has measured maternal health workers' performance in low- and middle- income countries throughout the past decade. In addition to there being no clear, agreed-upon, universal measure of performance, the above demonstrates large variation in what is understood as 'performance', with variation in terms of what is considered a determinant, component, or outcome of performance, that unclearly link to existing theories of performance. The large variations in performance definitions, conceptualisations and measures further evidence the need to develop contextualised scales that are tailored to the context within which the scale will be used. Moreover, there's a need to distinguish what is considered a determinant and outcome of performance in context, given the disagreement or inconsistencies around these in the literature too. Therefore, the next chapter will explore how performance is defined, constructed and determined in the context of Sudan in order to develop a practical measure for the CMW cadre understudy.

5 Chapter Five: Performance in Sudan Context

Introduction

Building on the result of the systematic literature review, which identified the performance-related factors for RMNCH in LMICs, this chapter presents the results of an exploratory, qualitative study to define performance of community midwives in the Sudanese context. As presented in Chapter 2, the stakeholder analysis identified four cohorts, purposively selected based on their position, the body they represent, and their expertise in the field of RMNCH for inclusion in this phase of the study. The results of the 13 interviews, seven workshops, and four focus group discussions conducted with the key stakeholders are presented here such that they (i) complement the desk review, by adding to the historical and contextual understanding of CMWs; (ii) contribute to our understanding of the factors that affect CMW performance under the PHC expansion programme; (iii) describe how performance is perceived, defined, and influenced in the context of Sudan; (iv) identify the main components of performance to be measured; and identify (v) how these should be measured, at what frequency and through which methods. These factors are subsequently taken forward in Chapter 6, where a consultative process is used to determine what items should be included in the tool, and how these items should be assessed.

5.1 Primary Health Care (PHC) Expansion Programme and the role of Community Midwives (CMWs) in Sudan

As reviewed in Chapter 2 (section 2.2), reproductive, maternal, newborn, and child health (RMNCH) indicators in Sudan are among the worst in the region. The Federal Ministry of Health (FMoH) assessed progress towards the MDGs, mainly MDG4 and MDG5, and given inadequate progress, placed an acceleration plan to meet or at least progress positively towards SDGs 3. As part of this, the universal health coverage (UHC) primary health care (PHC) expansion programme was adopted in Sudan in 2013 to achieve 'Health for All' in the SDG era. The desk review returned a lack of available written documents and information on the development of the PHC Expansion programme. However, interviews with

relevant, identified, stakeholders were used to gain a deeper understanding of RMNCH in the Sudanese context.

5.1.1 History of the Expansion Programme

Key informants indicated that the expansion programme was initiated in 2012, originating from a health map exercise survey. The results of this survey revealed that 14% of Sudan's population were not geographically covered by PHC services, with existing centres failing to provide a basic or comprehensive PHC package. The aim of the expansion programme was, therefore, firstly, to make available quality PHC services within a five-kilometre radius, or 30-minute walk to each individual, or catchment area covering 5,000 of the population. As part of the expansion programme, there should be at least one PHC centre per village, whereby a village was defined as an area of more than 2000 people. However, the definition of village had to be adapted as part of the expansion programme, as explained by the programme sub-directorate:

In another phase of the project, we drew back from the 2000 standard to 1000. Why? Because we found that many villages in Sudan are isolated and especially in the rainy season of autumn, so we drew back from the standard. (R1)

Therefore, the expansion programme started with essential infrastructure elements, including building centres and units in areas with no services, to reach 95.3% coverage. In addition to the building of new premises, some existing health centres were upgraded to include the five basics within a PHC service package: nutrition, immunisation, antenatal care (ANC), integrated management of childhood illness (IMCI), and outpatient care.

Secondly, the expansion programme aimed to address the shortage of health workforce (HWF) at the PHC level. Key informants recalled how cultural factors, including a preference for deliveries assisted by traditional birth attendants, as well as a shortage of hospital staff and insufficient beds, contributed to the decision to train a frontline HWF. As explained by the RH sub-directorate:

We have a significant gap in the community. We are not training to promote facility delivery because it is not only the culture barrier, but it is also a health system barrier. So, we do not have enough hospital beds and

enough capacity to handle the cases. Hence, we prefer to tackle and design the project to keep the hospital for the referral cases and for the clients that prefer facility delivery, but we are not pushing [women] to come to the facility. (R2)

To address gaps in RMNCH, it was deemed preferable to introduce a new cadre, rather than trying to promote facility-based delivery, for both cultural and capacity reasons. The number of HWF to be trained was calculated based on catchment-population ratio and geographical coverage. However, key informants later acknowledged that healthcare-seeking behaviour differed significantly across states, with marked differences across cities in the Western, Eastern, and Central states. They admitted that these differences should have been considered when calculating the need, rather than relying solely on international standards of health worker per population. Examples given included the capital Khartoum, or other suburban towns, where institutional deliveries are the norm and where very few would accept to receive services from other cadres. Similarly, residents of the central states of Gezira and Hasahessa town would prefer seeing a doctor rather than a CMW. In contrast, people in some other states prefer home delivery, as explained in the following quote.

In West Darfur in Genina, you will find in the hospital that the midwives are relaxed and the labour room is clean. You would wonder if this country does not have deliveries or what and you observe that the Genina is a huge and crowded city, but even the nearest one to the hospital will not bring his wife there but will deliver at home they depend on the old midwife or TBA whether she comes or not they deliver at home it depends on them, but they do not come to the hospital. (R2)

Cultural beliefs, including the community's attitude and response towards institutional deliveries, therefore played a key role in determining the aims and direction of the expansion programme. Specifically, it was quickly realised in the planning phase of the programme that the infrastructure component of the expansion programme would be insufficient to achieve PHC. Therefore, what was needed was a specific cadre who could deliver the integrated PHC package at the community level in those states where institutional deliveries are uncommon.

Accordingly, three new types of cadres were produced to provide basic PHC services: the community health worker (CHW), the medical assistant (MA), and the community midwife (CMW). These trained cadres were developed to provide an integrated package of primary health care services at the community level. During the 1960s, when PHC was first adopted in the country, CHWs and MAs were key HWF frontline cadres, but later in the 1980s, as the national health system direction changed, the production of these cadres ceased. Medical assistants were of great benefit to Sudan's nomadic peoples that do not have continuous access to health facilities, as the MA lived and travelled with them to provide basic health care services.

As described in Chapter 2 (Section 2.2), the community midwife was introduced as a new cadre in 2013 to address an estimated shortage of 14,000 reproductive, maternal, newborn, and child health workers. The goal was for this new cadre to be produced by the year 2016, reinstating the 'one community midwife for every village.' During key informant interviews and focus group discussions (FGDs), RH state coordinators expressed that this new cadre (i.e., CMWs) was to provide maternal, newborn, and child health services at community level based on "continuum of care," or integrated health care throughout the life-cycle. Moreover, CMWs were to have the knowledge and skills of a skilled birth attendant and be trained to provide comprehensive and integrated health care for the community at primary health care level.

One of the main drawbacks identified by participants of the previous village midwife (VMW) was her lack of basic nursing skills. The CMW training programme was therefore designed to include a nursing component. CMW further provides health care services for the mother and community, requiring her to master basic lifesaving skills. Key informants responsible for the curriculum of the community midwife recalled how the curriculum was developed in 2013. As stated by the head of the CMW curricula development committee, "In the development of the (CMW) curricula, the main reference is the ICM competencies". (R3) Based on the core competencies of this "International Confederation of Midwives', the training was designed as an intensive, 18-month programme, delivered over three semesters.

According to key informants, a conscious decision was made by the government to produce this cadre in less time than it normally took to train a skilled birth attendant. This decision was made given the urgency and inability to wait for a minimum of two years for the technical midwife to graduate. Stakeholders from key international organisations (IOs) also shared this understanding of the decision given the RMNCH context and the production of SBAs:

Ok, I was saying that the skilled birth attendant (SBA), if we want to achieve, is not that easy in Sudan because it needs at least a minimum of a diploma, and it is a post-graduate degree. Accordingly, I met colleagues from different countries, and for example, in most countries, the duration of basic education is three years, and some of them have bachelor's, so some of them have a clear career pathway that is very clear. (R4)

As several of the key stakeholders described, the government adopted the principle of “one health worker is better than no health worker.” However, some senior nurses, midwives, and union members challenged the training duration of the CMW, querying whether it was enough to produce a skilled birth attendant (SBA). Other key informants, pointed out that they raised this matter during the development of the curricula and establishment of the programme, as described by a senior instructor and Nursing Council member:

Moreover, we think the duration of her [community midwife] training is concise. Eighteen months is not enough. I mean even the ICM and FIGO criteria for midwifery, direct entry at least three years. So, imagine a person with such skills. So basic nursing is a must, followed by at least 18 months midwifery to be eligible to be a midwife. (R2)

As described in Chapter 2 (Section 2.2), community midwives are trained at federal and state levels, through the Ministries of Health (MoH) branches of the Academy of Health Sciences (AHS), and their affiliated midwifery schools. Given the severe shortage identified in the Western states, production was further accelerated by training community midwives in the five Darfur states and the capital Khartoum through the 'Omdurman Midwifery School'.

5.1.2 Factors Affecting Performance of the Expansion Programme

Key informants recalled that although the expansion programme had a slow start, the past three years witnessed remarkable progress thanks to the availability of additional funds. At the Federal level, key informants stated that the targets of the programme had been met, facilities have been constructed, and CMWs trained, creating better working facilities for CMWs. At the time of interviews, participants recalled that the expansion programme had reached more than 90% of its geographical coverage, infrastructure, and HWF training targets. However, some key informants stated that there is cause to question the reliability of the coverage rate within the expansion programme. Key informants and RH state coordinators also offered further insight into the factors affecting the performance of the Expansion programme. Grouped under the following themes, these factors were related to include CMW recruitment politics, States' training capacity, CMW deployment, socio-cultural norms, and ethnic diversity and autonomy.

5.1.2.1 Recruitment Politics

Firstly, key informants recalled how recruitment procedures were set up such that every state was asked to nominate a designated number of candidates that met specific selection criteria for enrolment in the CMW training programme. Candidates had to be younger than 40 years of age and have a Sudan Secondary School Certificate. Most importantly, CMWs had to be selected from the communities where they were from, by members of their community, and come back to serve their community after graduation. Results from the key informants and group discussions with RH state coordinators suggest that in reality, however, the recruitment of CMWs faced several challenges.

So there were many challenges we had to face, which forced us to come up with solutions to solve and convince the people to be involved in these issues. Therefore, you will find some states with excellent performance in recruiting midwives and others not and persists to this day, and we are working on it extensively with teams from federal and state levels to try and convince them to be included [recruited]. (R2)

Among the challenges identified was health system stakeholders reported variations in the recruitment of candidates into the CMW programme within and across states. These variations in recruitment led to an extension of the programme for an extra two years.

5.1.2.2 States' Training capacity

In addition to variations in the demand for CMWs across states, key informants and RH state coordinators reported differences in the capacity of the various midwifery schools to deliver the necessary training, potentially leading to significant variations in the performance of CMWs as affecting the performance of the Expansion Programme. Individual states, such as the five Darfur states, where there is arguably greatest need, lacked the capacity to train CMWs within their midwifery schools. Consequently, many of their CMWs were trained in different states, especially Khartoum state. This was reported to create greater collaboration among states and meant that trained CMWs were ultimately able to work across ethnic barriers.

5.1.2.3 CMW Deployment

Key informants explained that in 15 of the 18 states, HWF is poorly deployed, and PHC facilities are not functioning. As such, they continue to face a critical need for the CMWs, undermining attempts to improve RMNCH in Sudan. Some informants reported an overall rate of CMW deployment in 2017 at only 36%. Moreover, the states in greatest need, including the five Darfur states of Central Darfur, East Darfur, North Darfur, South Darfur, and West Darfur, have yet to incorporate the CMW within their health system in terms of employing the graduate midwives. Informants identified this as a significant drawback, disabling the link of the CMW to the health system, and therefore preventing essential follow-up care for RMNCH.

Despite a Presidential directive asking state governments to prioritise employment and deployment of midwives, key informants stated that an average of only 55% of the midwifery workforce is actually taken into public service. This is indicative of one of the most impeding challenges facing performance under the expansion programme. As a result, CMWs in many states are not linked to the health system, and their deployment is not optimised. A few states, however, did prioritise employment and deployment of CMWs. Blue Nile, Kassala, and the Red

Sea states' all employed all their available CMWs. Other states, such as Sinnar, have all twenty newly established PHC centres running while also employing newly graduated CMWs.

5.1.2.4 Socio-cultural norms and ethnic diversity

The RH state coordinators discussed that midwifery is culturally an unacceptable profession in many areas of the country. Part of the reason for its perceived unacceptability as a profession is the nature of midwifery, which permits the midwife to enter strangers' households to attend deliveries, and working long, flexible, and sometimes awkward, hours considered culturally unacceptable by more conservative households. Furthermore, midwifery, like nursing, is linked to specific ethnic groups or lower socio-economic status. This picture is slowly starting to change; however, as expressed during focus group discussions with the RH state coordinators, the White Nile RH sub-directorate manager stated:

Let's be honest; we do face challenges in recruiting candidates to the programme, where some villagers disapprove of the midwifery profession because you know its link to ethnic groups or low social status. (FGD-1)

Key informants described that some ethnic groups, such as the Rashayda tribe in Eastern Sudan, are willing to pay for health care but are not willing to send their daughters to be enrolled in the midwifery programme. Recruiting CMWs from these communities is impossible for the FMoH as the Rashayda would never allow their daughters to firstly, work, nor would they allow them to practice what they see as a poor person's profession.

The nature, ethnic, and social structure of such tribes, predominantly residing in the East of Sudan, is very conservative, creating complexities and challenges in recruitment and deployment of CMWs. As one key informant explained:

We can find closed communities that do not allow us to recruit their girls...we faced an enormous challenge. So, we tried again, and it took us a while to monitor their acceptance level of girls from other tribes because he (head of household and village) refuses to allow you to recruit, nor does he have an eligible girl to be recruited. (R1)

Furthermore, certain tribes, such as the Hadandawa, also in Eastern Sudan, did not accept the recruitment of their girls into the CMW programme. Additionally, these tribes would not accept others from different ethnic backgrounds to deliver health care services to their wives or communities, as they are considered strangers. As one key-informant explained:

For example, if we recruit a girl from the nearby village, will they accept her? because there are some tribes as Hadandawa, if you told them we would get a Biniamryia [another tribe in the area], they'll prefer their wives not to deliver, and this is another challenge. (R1)

5.1.2.5 CMWs' Autonomy

Several CMWs shared their experiences during one of the participatory workshops conducted, revealing their lack of autonomy or choice. For example, one CMW from the East was denied the chance to be enrolled in the CMW training programme, even though she was accepted, only because her father forbade her. In such societies, women lack the autonomy or right to discuss matters concerning their future or life choices.

I gave my father my acceptance letter, he shredded it and said, 'you want to act disrespectful to go from one house to the other', and he throws the letter away. (FGD-2)

It was not until years later when she was getting married, that the condition of her marriage made it possible for her to become a CMW. Moreover, sending women to attend CMW training was particularly sensitive in more conservative communities, where girls are not typically sent for primary education, let alone specialist training. The idea that they would send their daughters and wives for 15 months into the city to be enrolled in the CMW programme was unacceptable and, therefore impossible.

5.2 Performance in Sudan Context

Following on from the previous section, which identifies several of socio-cultural factors that may impede the performance of CMWs, the following section is focused on (i) defining performance and (ii) factors that determine performance in this context, as explained by the health system stakeholders themselves.

5.2.1 Defining Performance of CMWs in Sudan context

In general, reproductive health stakeholders stressed that the measure of performance was fundamental to health care delivery and the health workforce. The CMW training bodies also emphasised that it is insufficient to train fourteen thousand CMWs, equip them with knowledge, skills, and competencies and leave them without assessing their performance.

Among various definitions given, key informants, ranging from policymakers and members of professional associations, understood CMW performance as “doing her pre-assigned job and doing it right,” which resonates with “Campbell (1993) definition of performance, who describes the individual performance as “what the organisation hires one to do and do well” (p.40). Furthermore, as performance is described to be multidimensional (Campbell, 1990; Carlos & Rodrigues, 2016; Sonnentag & Frese, 2002), national stakeholders also highlighted that “the rightful demonstration of knowledge and skills,” and “the completion of a task according to the pre-set standard.” Common to two of these definitions is the emphasis placed on performance being evaluated against a pre-determined set of tasks. Along the same lines, the training bodies and reproductive health directorate further defined a well-performing CMW as, “one who conducts a safe, clean delivery, early detection of danger signs, timely referral when required and postnatal care for the mother and baby”. One key informant, when asked what performance meant to them, responded:

So, performance to me at its fundamental levels means a midwife that serves her community and maintains and follows a pregnant lady, secures safe delivery, registers this delivery, refers her in case of complications, and produces her periodic reports and maintains them. (R5)

Here, the training bodies offer insight into the types of tasks that a CMW is expected to know how to perform. Similarly, several vital informants defined performance in terms of functionality, whereby a functioning CMW executes the duties assigned to her.

According to key informants, performance is also linked to productivity, whereby the better the CMW performs, the more productive she is:

So, performance is related to productivity, and to me, it means becoming functional and becoming competent in delivering health care as per the terms of references (TORs) and job description. (R6)

Again, performance, as set against a pre-defined set of tasks or skills, features as an essential component of the definition of performance. Indeed, most of the stakeholders' understanding of the CMW's tasks seemed to resonate with the orientation and content of the CMW training curriculum.

Consistent with the results of the systematic literature review, all stakeholders stressed the concept of quality of care as an essential part of the performance. As one RH state coordinator stated in a workshop plenary, "a CMW with knowledge of quality, skills of quality, and competencies of quality will deliver health care services of quality." CMW's performance was, therefore recognised as knowing, conducting, or delivering quality care services, where the quality of care acts as a cross-cutting component of performance. Other notable themes linked to CMW performance emerging from the key informant interviews related to the availability, accessibility, and acceptability were key informants considered essential prerequisites for the measure of performance of CMWs.

5.2.1.1 Availability of CMWs

As per the health map exercise, the physical presence of the CMW within the practice setting was considered the first essential step in defining performance. The concept of availability for key informants can be summarised in terms of the theme "being there". As one key informant described, "for CMWs, being there means being with the community. So, for instance, we train CMW for a village, for example, and is living in the village itself is the basic principle in performing". Absenteeism was therefore considered an indicator of poor performance; if a CMW is absent, she cannot perform. In general, absenteeism was identified as a significant problem in the Sudanese context. The challenge of availability was considered remediable by addressing the numerical shortage of HWF.

5.2.1.2 Accessibility of CMWs

Key informants reiterated that a trained CMW providing health services should be accessible within every village.

In pregnancy the challenges that we face is that not all villages are covered with midwives, so the beneficiary is in the east, and the midwife is in the west, and there's a river in between, so she is affected during pregnancy, she can't follow up and in labour, delivers with the TBA in her neighbourhood. (FGD2)

In most, if not all, she should reside within the village itself, which key informants considered a fundamental requirement of performing. Geographical barriers, seasonal change, and poor infrastructure play an impeding role in the accessibility of the CMWs to the community she serves.

5.2.1.3 Acceptability of CMWs

The acceptability of the CMW was also regarded as essential to CMW performance. Acceptability spans the health system supply-side, existing RH cadres, and to the community, she is serving and is affected by factors such as the age of the CMW:

You see, I told you, we didn't open the discussion with the states, but I recall that Sister H and a number of the Darfur coordinators told me that these young girls will not be accepted by them (women) clearly, so this is one of the issues. (R2)

The community's uptake of the CMW services was thought to serve as a useful indicator of how accepted the CMW is by the community and how good her services are. As one male key informant explained, gradual acceptance of CMWs was often the result in people experiencing for themselves the value of having CMWs in their village:

In Hamashkorayb city [in Eastern Sudan], the local doctor had no nurses, but with the assistance of the CMWs was providing health team-oriented health care to the citizens, who started to notice the importance of such health programs, with the CMWs giving injections, inserting cannulas, treating children and community members. They started to appreciate the CMWs, their training, and to gradually accept their presence and treat the men in the village. (R1)

Second, challenges emerged in the acceptability of the CMW from both the RH health system and the community she serves. From the health system, change in HWF strategy was directed towards existing informal reproductive health (RH) cadres, such as the traditional birth attendant (TBAs) that were no longer to be invested in and trained:

At some point, the government invested a lot in those TBAs and tried to improve their capacities, but a point came when they realised that a TBA would never be the cadres to reduce maternal mortality, but we had to live with the reality that they are there, they are working, people believe in them and can't just wipe them out. (R7)

Poor acceptability of the CMW by the existing TBAs, may in part, be explained by a loss of income and status because of introducing the CWM into a community. Moreover, CMWs enjoy the support and endorsement of the FMOH and are recognised as part of the formal health system. Thus, CMWs feel a sense of empowerment within their communities and further exercise the leadership role that accompanies the profession in the village context and among locals. Also, unlike TBAs, the new CMWs shadow the certified senior midwives, who gradually introduce the CMWs to the community, enhancing their acceptability and influence. As one male key informant explained, the vouching of CMWs by a more senior cadre was an important step in building trust between the CMW and the health system, especially for conflict-affected states: "In other communities as in the conflict-affected zone of Gulu in Mara Mountains, the senior midwives advocate for the new CMWs among the RH system and lobby for their deployment in the formal health system" Gradually, efforts such as these, combined with a persistent national thrust, managed to convince the state governments to allow the opening of a midwifery school and to promote girls' education. One such example given was that of the Hadandawa tribe of Kassala state:

Yes, the Hadandawa [a tribe in Eastern Sudan] are closed communities, they were also challenging but thank Allah we managed to convince them by establishing the (midwifery) school we convinced them and think that we succeeded in resolving part of the closed community challenge in the east. (R1)

Here, the CMW does not fit the traditional midwife stereotype, being that of an old, dignified lady with vast experience and wisdom. Compared to the TBAs, the new cadre is younger, and the communities perceive her young age to be linked to insufficient years of experience. As a result, the community would not take her seriously and would be reluctant to approach her and seek her help. For example, some communities in the West were reluctant to accept the new CMW cadre:

So, you just saw Darfur midwives, they are mostly young, the community is used to the figure of a midwife, which is old, dignified so they can't deal with the fact that this young girl is a midwife especially Darfur, so there's a challenge in dealing with this new generation. (R1)

The key informant and RH coordinators further noted the need to enable the CMW to deal with the transition away from her village. Given that most CMWs come from remote villages (i.e., Darfur or on top of Mara Mountain) to train in the city before returning to serve at home, participants noted that the "CMW, goes through a cultural shock; first when recruiting her from her village (rural setting to the city- urban setting) then back when deployed". Key informants noted the need to include more robust support systems allowing CMWs to re-adapt and better cope in their villages to deliver health services.

Additionally, the shortage of literate candidates within the villages was also a challenge raised by key informants and RH coordinators. As is the case in the Red Sea state, where mostly illiterate candidates were enrolled in the programme and later offered evening classes as part of their training programme, as explained by their RH state sub-directorate.

Red Sea State has different maternal health workers providing services. The unavailability of literate candidates challenges the CMWs selection. The policy 'One CMW for every village' is being implemented in the state. However, the villages that currently need CMWs do not have any literate candidates; therefore, we are recruiting illiterate [CMWs], enrolling her in extra classes of literacy, but that increases the burden on her (CMW). (R8)

5.3 Determinants of Performance

When asked about the factors that are thought to predict the performance of a CMW in Sudan, three key themes emerged from discussions with stakeholders, including CMWs, as illustrated in Figure (11). The first determinant identified was the situational or contextual factor, which is further broken down into the health systems' supply and demand sides. The demand-side includes socio-cultural health beliefs, norms, and taboos, in addition to financial hardship and choice for healthcare. Supply-side factors included the quality of CMW training, remuneration, supervision, and work environment. The third determinant identified as the individual/motivation factors, which includes factors that relate to the CMW's satisfaction and motivation for working as a CMW.

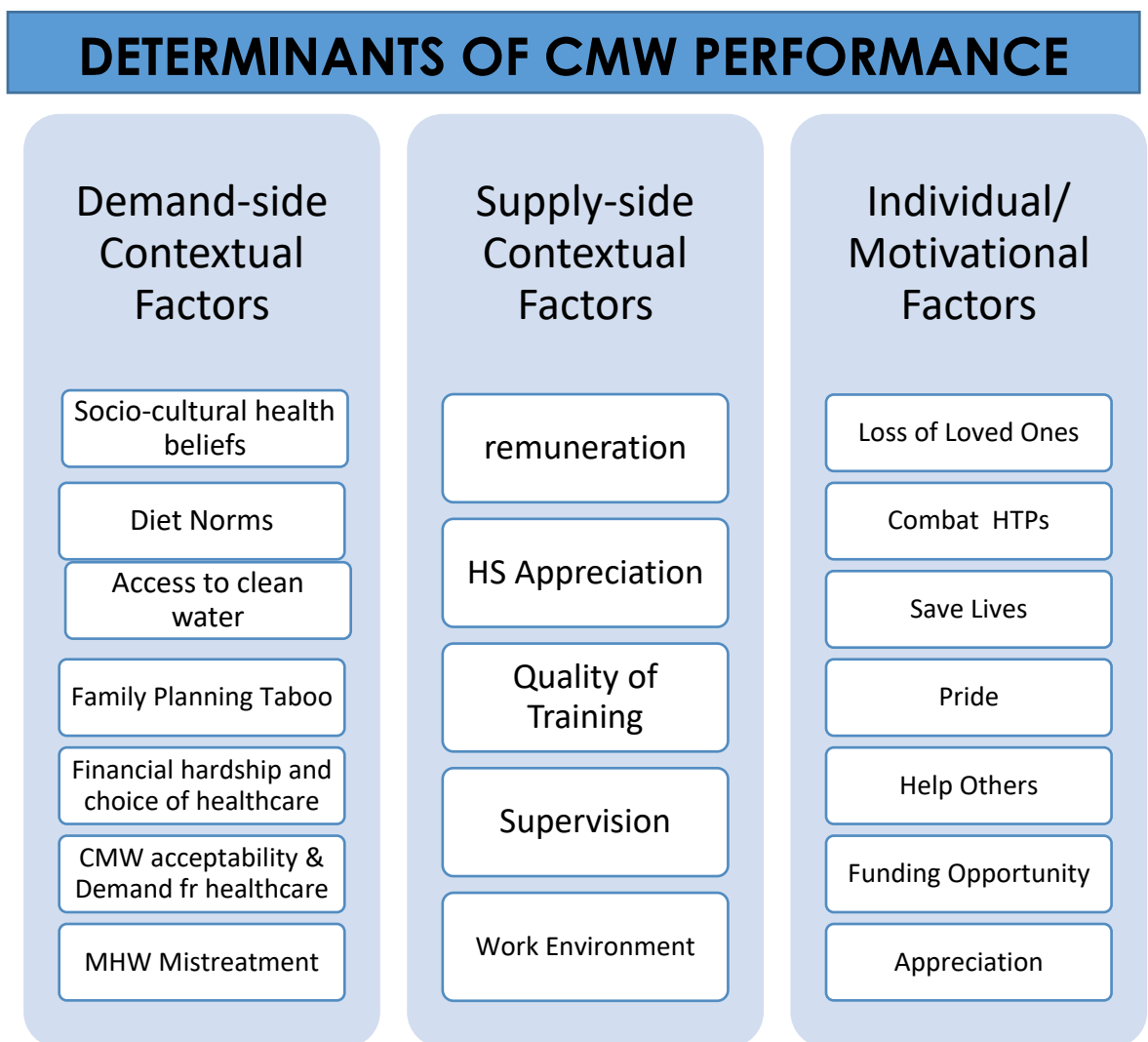


Figure 11 Determinants of CMW Performance

5.3.1 Demand-side Contextual factors

The demand side of the health system is considered to consist of the client, patient, or beneficiary (i.e., the end-user). In the current study, the demand-side is mainly females of reproductive age receiving healthcare services from the community midwife for herself and her newborn. The performance of the CMW was seen by the KIs and RH state coordinators, as determined mainly by the diverse settings in which they work. Specifically, key informants identified, “the demographic variation in different areas of the country, literacy level and health awareness level,” as key determinants affecting the performance of CMWs.

CMWs, RH state coordinators, and key informant interviews offered a better understanding of the day-to-day challenges facing communities, and in particular women, in low-resourced contexts, including hard-to-reach communities and the post-conflict settings CMWs operate in. Understanding the culture, norms, beliefs, and taboos that shape society and influence the women’s daily decisions was reflected in the women in the communities, including their healthcare-seeking behaviour and demand for healthcare. Community factors included the low socio-economic status of communities, literacy levels, and previous experiences of health care services.

5.3.1.1 Socio-cultural health beliefs

Participants expressed that in Sudan, many believe in traditional medicine and often seek informal healthcare within the systems that exist internally, within their tribes. In some cases, the treatment provided by anyone outside the tribe is considered unacceptable, shaping their healthcare-seeking behaviour and negatively impacting their health. CMWs further shared their insight on the different practices and misconceptions women in society have during pregnancy, childbirth, and the postnatal period. Many of the cases they described took place in the post-conflict West Darfur region villages, and hard-to-reach communities living in hardship conditions. While in the puerperium, some CMWs discussed the habit of some mothers new to pregnancy who culturally would not move, walk or get out of bed for 40 days, increasing the chance of deep vein thrombosis (DVT). Some women would not bathe during this period either, affecting their personal hygiene leading to infection, and resulting in puerperium fever. As one CMW explained, “these new mothers would stay in bed until we come for postnatal visits and walk them around and warm water for them to bath to prevent infections.”

These examples shed light on the challenging context the CMW operates in affecting her performance.

5.3.1.2 Dietary Norms

The nutritional status of women was also highlighted, where the CMWs reflected on the low socio-economic status of women and how this affects their ability to access a well-balanced nutritional diet, "she comes to prepare dinner, and she cannot afford to. She suffers". Dietary norms were also discussed by the CMWs, where pregnant women are advised to avoid a particular type of food by the elders and neighbours under the misconception that it may cause complicated pregnancy or labour:

Yes, they tell her not to eat eggs because it causes proteinuria. They do not eat meat because it is said to increase the size of the foetus's head, but we give her the right advice and sometimes she does not eat well in her early pregnancy. (FGD3)

Some say if you eat camel's meat you will get a prolonged pregnancy, more months and will have an obstructed labour and they also do not drink hibiscus juice they think it will increase your BP, and we face these problems when they (beneficiaries) come and visit they tell us we were told not to eat this nor drink that. (FGD3)

Consequently, the CMW deals with a community influenced by unbalanced dietary norms and taboos that weaken their health status and render them prone to malnutrition, infection, and complicated pregnancy and labour carrying a negative impact on the CMW's performance.

5.3.1.3 Access to clean water

The unavailability of safe tap water means that a woman's daily chores continue both during and after pregnancy, where women walk for a long distance to collect and carry heavy water-filled containers for their household, a potentially harmful practice' "pregnant women do not shower. However, she should shower, but she does not. The water is far from home". This daily chore persists as an impending risk on the mother and baby's health and therefore influences the outcome of the pregnancy and CMW's performance.

5.3.1.4 Family Planning Taboo

Family planning was agreed as a “no go area” by many CMWs as many communities do not accept it. CMWs shared that, in their experience, and especially in communities in the West and East of the country, women do not even consider family planning as an option. As one of the CMWs from Darfur discussed during the plenary workshop:

Family planning brings problems, you can speak about everything, but once you mention family planning, it is a problem. But if you do seminars gradually and tell them suitable messages, today and tomorrow they will listen.

When asked why women did not consider family planning, CMWs responded that “Some women say that FP is forbidden in Islam, which is not true”. During the participatory workshops in the eastern state of Geddarif, some CMWs shared a local saying that “every year comes with a newborn” while explaining the social norms resulting in pressure on women always to get pregnant.

CMWs further explained that men perceive family planning to be unacceptable because they consider that if the wife does not want to get pregnant, he is failing her, affecting his status in society by failing to provide all required preparations for the newborn and its associated festivities:

Not all men understand spacing. He thinks he is failing her; that's why she does not want to have kids. He says he brings the food, drink, clothes, curtains, and beds (things culturally provided for a woman who just gave birth for the fiesta and to redecorate her room for when visitors come and give their blessings) so he does not consider her health, whether she is fatigued, exhausted or tired or not, it never crosses his mind.

The participatory workshops with the CMWs from Darfur further suggested that there is fear that the husband would co-marry (i.e., take a second wife or practice polygamy) or leave the wife if on contraceptive pills:

Some, if they space for a year or two, the mother-in-law or sister-in-law tell her you don't and cannot bring babies, so we will get you divorced and marry him to a new wife. This is also a significant defect in FP. So, she is afraid to get a divorce or for her husband to marry again.

The CMW further added that if a woman takes the pill without her husband's knowledge or consent, and if this becomes known, then this might also lead to divorce:

Some women want to take contraceptives, but their husbands refuse, which can lead to problems and even separation. You see, the woman understands, but her husband does not. When she finds the pills and takes them, her neighbours tell her husband, which causes problems, and the man leaves her. That is why women are afraid of FP. (FGD3)

Another reason family planning is undesired by women is the fear of side-effects.

[The women] say it causes diseases, obesity, diabetes, and any other disease a woman gets. Some women say, FP causes holes in the uterus and leads to cancer, but that is not true. That is why they do not use it they think if they use FP, they will not conceive again. (FGD3)

Consequently, the different family planning taboos create obstacles in practising contraception methods when and if needed. Furthermore, challenging the woman's physiological recovery from labour and birth-spacing benefits for both her and the newborn, negatively influencing CMW's performance.

5.3.1.5 Financial hardship and choice of healthcare

Key informants highlighted that some communities could not afford to pay for formal healthcare, "the family cannot pay 50 pounds for her (CMW), so even the area that they work in and they serve is challenging" (R2). On the other hand, beneficiaries emphasised the importance of a caring and considerate CMW, given the high cost of living and the inability of most mothers to provide the necessary prerequisite supplies for delivery or afford the CMW's delivery fees.

The midwife asks why you did not save from early, then comes complaining of the little money you give her when the woman does not even have money to buy lunch! (FGD4)

Importantly, beneficiaries expressed their discontent with the fees charged for delivery by the CMWs, given the financial hardship the families live in and the low socio-economic status of communities. Thus, resulting in community dissatisfaction towards the CMW and influencing their choice of health care and

delivery services to the benefit of unskilled birth attendants, impacting on the CMW's performance.

5.3.1.5.1 Birth plan

The CMWs stressed the importance of the birth plan, where they advise the pregnant woman to start saving money for birth, including purchasing medicine and anaesthesia: "And if there is some money in the house she puts one or two pounds aside in a piggy bank so when and if there are complications during labour she takes this money box, maybe the people in the hospital will need money for medicine and so on." All these preparatory measures are in place to allow for institutional delivery by a CMW preventing maternal morbidities and mortalities. However, non-compliance may result in delayed response if faced with complications during labour, hardship, and negative impact on CMW's performance.

5.3.1.5.2 Transportation

The pregnant woman might need transport to the nearest health facility in case of emergency, requiring money: "In labour, it might not be normal, maybe caesarean section and needs money and her man (husband) might not have money, so she does not suffer/ be in more need." However, due to lack of fault of the CMW, they are accused on many occasions for poor maternal outcomes due to delay in reaching the health facility that is mistaken for the delay in deciding to seek health institution care.

5.3.1.5.3 User-fees

The fees charged by the CMW can differ, based on the sex of the newborn, with higher charges demanded for male newborns than females.

First, doesn't the midwife have a salary from the government? She should not charge on each delivery! This is very shameful! They charge fees for a boy or girl delivery. The mother is in labour, and she charges the father, what if he does not have money or the whole amount at that time! (FGD4)

No midwife does not charge! For example, she will charge you 300 pounds for a boy's delivery and 200 for a girl and now a boy's 400 and girl 300. Sometimes the father cannot afford to, or his income is low (FGD4)

While the policy is for the service to be free of charge, it is customary to pay the CMWs out of courtesy and through in-kind gifts for her effort and support to the family. Other beneficiaries shared their experiences and informed the group that the CMWs never charged them, as stated by a participant in one of the focus group discussions in White Nile state “I delivered twice by the CMW-R, and she never charged me, and for that I am thankful” (FGD6). Overall, resulting in a discontent community that is discouraged from approaching CMWs, negatively affecting the CMW's performance.

5.3.1.6 CMW acceptability and demand for healthcare

On a similar note, some communities appreciate the CMW's services, creating a supportive, enabling environment for the CMW to practice, as highlighted by the RH Directorate:

There is this supportive environment where appreciation of the community is translated in their use of her services, but if she is in a village and people seek help elsewhere and not come to her, that has adverse effects on her performance. (R2)

These factors were thought to influence performance through the community's demand for healthcare and the health-seeking behaviours of women of reproductive age:

Performance is also decided by a wider context where midwives execute her roles in terms of the enabling environment, the community itself, demand for health care and all this constitute part of the performance because in Sudan there are other settings with poor community demand for health services that affects the performance. (R6)

Adding to that, other RH state coordinators mentioned work environment and community acceptability as additional determinants of CMW performance, as stated

What influences the CMW performance can be her work environment and community acceptability. So, in this environment, she is influenced by both the community and the administration responsible for her to provide support to work in the community and if the community supports her or not. (FGD5)

5.3.1.7 Maternal Health Worker Mistreatment

During the FGDs held in the southern White Nile state, beneficiaries further recounted some of their experiences receiving hospitalised healthcare during labour, reporting how experiencing mistreatment from the midwives had led to a preference to deliver at home with the community midwife from their village that would respect and take better care of them:

In the hospital with my first delivery, I was humiliated. I did not know how and what to expect. They (midwives) were very rough, wanted to get the delivery done with. I was very hurt. This is not a way of treating people. I do not deliver here but only in hospitals. They induce labour, they are very rough in the big hospital unlike here when I call them they come and examine you and properly talk to you, very nicely and to me, the reassurance is enough (FGD4)

One of the beneficiaries further reflected on how the local CMW reassured and stood beside her during the delivery process. The sense of trust between the patient and CMW further emphasises one of the benefits of such frontline health cadres.

At home, they treat you well, but in the hospital, they mistreat you, which is what happened to me during my first delivery and second with the operation. I escaped from the hospital in my last and came to CMW, and here, it was 5 am, and she opened the health centre and reassured me. She took me to Rabak city [White Nile state] to the doctor and came back home. I refused the operation again, and when I came home, she visited me and convinced me to deliver in the hospital for my health and my child's too and not to orphan him early. I was afraid to die, but she convinced me that it's safe and nothing bad would happen. Her hearty sweet talk convinced me, and that's when I decided to go back to the hospital. She never left me throughout until I gave birth. (FGD4)

5.3.2 Supply-side Contextual factors

The health system's supply-side includes the ministries of health and different stakeholders such as regulatory bodies, professional unions, training institutions, experts in HRH, and RMNCH, among others that provide healthcare and produce health cadres at institutional and community out-reach levels. The supply-side

contextual factors further suggest remuneration, quality of training, and work environment as determinants of performance.

According to key informants, a sense of satisfaction towards the health system makes a CMW feel responsible, committed, and accountable, all of which impact on her performance, in addition to the above supervision, is also considered as a determinant of performance in Sudan.

5.3.2.1 Remuneration

There was a consensus among key informants that the cornerstone for a successfully performing CMW is her remuneration:

So, remuneration of this CMW, I think, is the cornerstone of success for performance. Since you have a salary and this salary is sustainable, this will keep her encouraged to exert more effort towards the families' women, children in the community. (R3)

The relevant key informants stated that though CMWs are only deployed in three of the 18 states to date, they are considered part of the health system and are entitled to receive salaries and be on the payroll. In practice, they are mostly given regular incentives instead of salaries from the state ministries of health. In many instances, however, they do not come and collect their incentive as their commuting fees to the locality is often more than the actual incentive they are due to receive. As one key informant explained:

Even when we are trying to accelerate the distribution of the incentive by bringing the midwives to the locality, the cost they need to pay for transport is more than the incentive itself, so again it is a challenge (R3)

As a result, they mainly live on what the community gives them whether money or in-kind, to sustain their households. As expressed by many, and although the CMW is produced as part of the formal health system, this is often not the case, as she is not formally employed by most of the state ministries of health.

When she [CMW] has a salary, which is sustained and incentivised, which could affect the performance because the salary and incentives will help her perform well without being bothered with earning sufficient income in the hardship conditions people are facing (R3)

Therefore, it was considered that until CMWs are recognised and remunerated; accordingly, they will not be able to perform to their full potential.

5.3.2.2 Quality of Training

Key informants identified the quality of training as an essential factor of performance. As one of the key informants mentioned, “if one was not well trained then for sure her performance will not be as expected, and this can be one of the factors to consider” (R4). The quality of training includes basic, in-service, or continuous professional development (CPD). As stated by the CMW curricula development committee, “I think there is an appreciation for some type of continuous professional development which will affect their (CMW) performance” (R3). Both key informants and RH state coordinators identified the number, type, duration, and frequency of CPD courses as important determinants of performance, in addition to the importance of offering refresher knowledge and skills training, as stated by the Directorate General HRD at the federal level “So, the area of basic training is the start of quality performance, and for the quality of her care to continue there must be CPD and for it to be appealing” (R9).

In terms of basic training, key informants stressed the importance of quality, “the most important thing is the quality of basic training, for if she is not trained in all these items, she will not perform” (R10). The training quality factors seen to influence performance include the number of tutors/instructors/facilitators per CMW batch, the instructors' competency, the teaching setting, and the quality of clinical practice in health facilities and midwifery schools. In-service or on the job training, conducted by medical doctors and obstetricians, where available, was also seen as an essential determinant of CMW performance. Unfortunately, it was also noted that these cadres rarely have the time to provide the required in-service training to CMWs.

5.3.2.3 Work Environment

The work environment also emerged as an essential determinant of performance and was highlighted by key informants as well as the Reproductive health state coordinators and the CMWs. An enabling work environment, described as the availability of necessary equipment, consumables, and supplies, would allow the CMW to practice what she was trained on and deliver her tasks as expected. Whether facing infection control or postpartum haemorrhage, the CMW was

expected to have the basic pre-requisite facility and consumables to manage the patient properly.

She knows the infection control measures, and if she does not have the consumables to do all the measures, the practice by default will be different. (R2)

Factors impeding CMW performance, therefore, also included the unavailability or lack of sustainability of the pre-requisite equipment, consumables, and supplies, all of which can influence the case management steps she will undertake to save her patient.

Consumables are a pre-requisite for her [CMW] duty. I can give you an example; I cannot teach her that if you discovered haemorrhage give potassium sulphate and she does not have it or to stop bleeding after delivery give ergometrine, and she does not have it, and so, this is essential pre-requisites for her performance and if she does not have and does not use it for a while she will forget how to administer it and consequently a gap will exist. (R2)

Moreover, a friendly environment was considered essential, especially for this cadre, a female-only cohort, which required comfortable housing and female-friendly working conditions to provide the required services.

5.3.2.3.1 Availability of Health Facilities

KIs and RH state coordinators noted that the work environment, facilities, amenities, and availability of equipment affect CMW performance. They highlighted that in some villages there are no health facilities, and, in this instance, the CMW is expected to provide healthcare services in her home or when visiting the patients or beneficiaries during outreach home visits, "We train the CMWs to provide the service if not at the PHC centre, then at the local school to avail a day for ANC or at her home" (R11). The CMWs also noted the difference in the availability of a nearby health facility in influencing the nature of her practice and management choices.

The poor health system infrastructure, unavailability of close emergency obstetrical care (EmOC) health facilities, bad roads, and lack of means of

transportation, were also brought up as key factors negatively affecting CMW performance:

She could not deliver her, and they wanted to cross the river, but heavy rains prevented them from taking her in the right time to the hospital on the other side of the riverbank, so the lady sadly died. (FGD6)

The CMWs reported the challenges they face in referring patients in seeking specialised help and saving lives in the absence of nearby health facilities.

We face difficulties during autumn (rainy season) in Bassonda locality at large, which has no Operation Room (OR), so we must refer to Doka or Gedarrif city. We advise them (beneficiaries) to move to Gedarrif early on, especially if she's a primaegravida. You see, the problem that we face is finding a doctor and sometimes we lose the baby! This is the biggest problem we face as a locality. (FGD6)

Furthermore, during the rainy season, delays sometimes prevent CMWs from seeking institutional help when needed.

5.3.2.3.2 Availability of equipment and consumables

The health system's supply-side participants stated the importance of considering the context in which the CMW practices when measuring her performance. They acknowledged the fact that availing the equipment, tools, consumables, and systems in place to support the CMWs is a challenge further influencing CMW performance. They stated that they provide the consumables once per year, in addition to any donations:

So, consumables are replaced based on what she [CMW] does and reported on. Anaesthesia, gloves, all that may be misused, and we receive for free it requires close monitoring. At this stage, we can manage to help her apply the knowledge she received. So, I think now it is just like driving a car, it starts with the intention to do this then after a time it will be automatic. So, I want to reach with the midwife to this stage when she has a labour she monitors and does as protocol, but unless all this is available, I cannot blame her. (R2)

The key informants expressed the adverse effects of the shortage and the need for more supplies. As a result, they reported purchasing equipment and

supplies at their own expense. They specifically highlighted the following as proxy indicators influencing CMW performance:

The existence of a health system, surrounding the enabling environment, and essential work pre-requisites are to be present before assessing the performance of the CMW. But without the surrounding environment pre-requisites, you cannot assess her performance. So, unless a system exists, and she has the essential pre-requisites can she perform. (R9)

Examples of health system appreciation include formally acknowledging the CMW as part of the health system and providing her with continuous supplies so that she can carry out her work, as highlighted by RH expert and former Director at FMOH:

Again, another way to appreciate and you know to reward them (CMWs) is by the continuity of the supplies they need to deliver services so that she keeps up good work. (R7)

5.3.2.4 Supervision

Key informants and RH state coordinators identified supervision from the health system as an essential determinant of performance. Specifically, they regarded continuous supportive supervision as the continuity of her quality of care, "the continuity of her quality of care requires supervision, so I must have continuous supportive supervision that must be done" (R9). A CMW that is not supervised, monitored, nor supported would be expected to demonstrate deficient performance. "Then, other factors that relate to performance is supervision from the health system itself. So, if the CMWs is not supervised or not monitored is not supported then that would affect her performance" (R6)

5.3.3 Individual/Motivational Factors

The Reproductive health state coordinators identified age, health status, and socio-economic status as key in determining CMW performance. They considered old age as a factor negatively impacting on performance. Furthermore, CMW's health condition is essential, whereby it is vital for a CMW to be fit and mobile, rather than ill and with limited mobility, so that she can conduct

her community outreach duties, including antenatal, natal or postnatal care visits. As stated during the plenary of the participatory workshop by one of the groups:

What influences the performance of the CMW positively or negatively is her health status, income, social status, financial stability, social security, age, qualifications and by that we mean the number of training courses the CMW received, supervision and acknowledgment and recognition in the form of financial or non-financial incentives (FGD7)

5.3.3.1 Loss of loved Ones

Among the many factors, CMWs highlighted as key to their performance; the most common was the motivation to improve their current condition. This was particularly resonant among the CMWs from Darfur, given their exposure to war and conflict for many years. Both CMW cohorts expressed being motivated by having experienced the loss of a family member or neighbour due to complications during delivery, the unavailability of a midwife or trained health personnel, a health facility, and or lack of means of transportation. As one of the CMWs explained:

I chose to be a CMW; we have three CMW in a huge village with valleys. During the rainy season, my sister was in labour and we went to the midwife, we found that one of the midwives had travelled and the other was sick, and the third was attending a delivery. She asked us to carry our sister to her. When we went to bring her, we found that the baby was crowning, and she started to push, and one of the elderly was asked to fetch a razor, she found an older man's hair razor used it and straw to deliver the baby. From that day I decided to become a CMW" (FGD2)

Furthermore, several CMWs expressed their choice of profession built on the injustice they observed while growing up

Initially, when I was young, I wanted to study Law because I could see injustice. For example, in a small issue, the oppressor is innocent, and then the wronged goes away. And then every time I go to the hospital I find the doctors being late and the sick are waiting, and the doctor is late, if he [doctor] goes for lunch he goes for 2-3 hours and people are waiting and their sick no one to care for them. (FGD3)

Therefore, the war and conflict conditions they grew up or lived in influenced their decision to uptake this career and train them to save the lives of mothers having experienced such tragedy.

5.3.3.2 Combat Harmful traditional practices

Likewise, several CMWs also identified being motivated to train as a CMW to prevent the loss of family members and neighbours caused by harmful traditional practices (HTPs), such as female genital mutilation/cutting (FGM/C), a known factor in obstructed labour. One CMW explained her motivation as "stopping the harmful traditional practices (HTPs), such as Female Genital Mutilation (FGM) and early marriage of minors by the conduct of lectures and seminars in the villages and communities" (FGD3)

5.3.3.3 Save lives/Maternal Life-saving skills

Also, training as a CMW, some believed, would give them the skills to provide professional help, including how to perform an episiotomy that can save the mother and child, or intervene earlier through community-out-reach health education seminars.

We had deliveries in the neighbourhood that went normal, but I had a circumcised relative, and we had rained, and there was no midwife to rescue her, and we were trapped. We started to panic, there was no transportation, and even if available there were floods, we started to panic, and there was no way we could cross the valley, and she was in pain. The uncircumcised can usually deliver alone but the circumcised cannot, and that is why I insisted on being a midwife to rescue people from the FGM (FGD2)

Deliveries were by TBAs, causing many haemorrhages after labour or death of the foetus because of their (TBA's) lack of knowledge. (FGD3)

5.3.3.4 Pride

The CMWs were very proud of their profession and spoke passionately about the need to save lives and their sense of responsibility towards their community.

I am very proud to have chosen the profession of midwifery, to decrease the maternal death rates that happen in our villages because of lack of health cadres. (FGD3)

Some of the CMWs, growing up, were influenced by role models within their community that worked as midwives and exemplified the heroic services that they were providing for the community. That sense of pride positively influenced their choice in choosing the profession and later on boosting their performance. They voiced wanting to be like them in the future:

I could not describe to you why I loved midwifery. When I used to see the midwife, I used to think that no one works in the community as her. We had a midwife in the neighbourhood everyone used to call her when we had a delivery 'mother Bakhita' so I felt that if I did not become a midwife, I would not be happy (FGD3)

5.3.3.5 Helping others

The CMWs in both cohorts re-iterated their eagerness to save lives and help fellow sisters, mothers, and women by assisting them during delivery and providing healthcare services and how it made them happy.

But I wanted from my heart to help the woman in need and to relieve her pain. If God wills and to be happy and to make her happy when conveying the news of her new-born. That is why I loved this humanitarian profession. The idea of helping a woman in need is not something simple, and that's why I put these things in my heart and wanted to do them (FGD2)

5.3.3.6 Funding opportunity

Other factors that motivated the CMW's to become a health worker was the opportunity to receive a fully-funded scholarship and the promise of full-time employment in their community after graduation. Some CMWs saw this as a career opportunity; others, the opportunity to fulfil their dream of becoming a doctor to help care for others.

Because we are many, I have three brothers, and I'm the fourth. My siblings did not finish their education. I studied until secondary school, but I could not continue to University, and then there was an advertisement on training to decrease maternal deaths, so I decided to go forward, but my mother

did not want to listen. My mother is nice, but she did not allow me to go because I was working. But thank Allah, she allowed me to come with her blessings I came. (CMW-IR Workshop 1 D)

A sustainable salary was seen to motivate the CMW and enhance her efforts towards better health care delivery to mothers and children within her community.

5.3.3.7 Appreciation

Other motivational factors contributing to CMW performance, as identified by informants and reproductive health state coordinators, included a perceived sense of recognition and appreciation, whether from the community or the health system.

She [CMW] needs appreciation. She needs to know that what she is doing is appreciated, and it does not have to be only during supervision. Appreciation from the continuous delivery of care, and I think this is what keeps our midwives going. (KILL)

Examples of community appreciation included when the community expressed their appreciation towards the CMW by treating them in a respectful manner or through the money and gifts they give them.

In summary, as shown in Chapter 2, the desk review identified a shortage of health workers, skill-mix imbalances, geographical misdistribution, scarcity of resources, contradicting health policies, and poor working environments negatively influencing health worker retention and encouraging outward migration. The key informant interviews further brought up several other essential factors preventing universal coverage for RMNCH in Sudan. These additional factors included cultural, gender, and traditional beliefs, in addition to the rejection of CMW cadres by TBAs, who see CMWs as a threat to their income and status. Even with increased numbers of reproductive health cadres produced as part of the UHC expansion programme, the availability, accessibility, acceptability, and quality of care provided by RMNCH workers still varies. Health labour market imbalances characterised by weak deployment policies, State ministries of health's inability to absorb cadres despite the need, dual practices, and weak performance management systems further present challenges to achieving UHC in Sudan.

5.4 Performance characteristics

Whereas the above section describes the factors that were thought to determine or influence performance, the following section presents the results of the main factors identified as comprising performance, which was ultimately selected as essential to measure CMW performance in Sudan. The key informants, RH state coordinators, CMWs, and beneficiaries all shared a common understanding of the duties of the CMW. Important for key informants and RH state coordinators was that any performance measure was along the continuum of care, regarding mother, newborn, and child health. How they should be measured, through which modalities, and at what frequency were also discussed.

CMW cohorts clearly expressed the importance of their role in participating in decreasing maternal and newborn deaths in Sudan. They determined their job as being comprised of the following tasks;

- guiding mothers to antenatal care;
- providing folic acid pills before pregnancy, with 3-months to prevent congenital anomalies;
- encouraging a delivery plan;
- for a mother to deliver with a skilled and trained cadre;
- identifying diseases related to pregnancy (i.e., pre-eclampsia);
- to reduce stress during pregnancy, labour and puerperium period;
- identifying genetic diseases early and refer these cases to a doctor;
- referral of emergency and high risk before occurrence;
- management of haemorrhage during pregnancy; puerperium or after that; early management before complications;
- identifying abortion and its causes;
- delivery of health education messages;
- improving newborn and death registration rates;
- identification and reporting of maternal and child deaths;
- Provided health tips and guidance for mothers and newborns, including the encouragement of exclusive breastfeeding for the first six months;
- encouraging/counselling for family planning after the first 40 days from delivery and;
- encouragement of vaccination of mother and child.

Similarly, the RH state coordinators identified the following as CMW responsibilities: providing antenatal and postnatal care, home visits, delivery skills, and referral of emergency obstetrical cases, counselling in PMTCT, family planning counselling, vaccination, and environmental health, saving mothers and children, and advising on the nutrition/dietary intake of both the mother and newborn.

In response to the “What are the characteristics of the CMW performance?” one of the RH state coordinators stated, “First of all the knowledge, attitude, skills, and practice are characteristics of a performing CMW, to be fully competent.” Furthermore, plenary discussions during the participatory workshop concluded that the CMW performance characteristics should include what was mentioned by the CMWs in addition to “responsibility and link to the health centre, presentism, delivery kit completeness, beneficiary frequency rate, acceptance from the community and provision of all services required from a midwife (FGD8). Further analysis of these interviews yielded the categorisation of the various responsibilities or indicators of performance of CMWs as falling under one of three themes: knowledge, competency, and compliance of CMWs. Figure (12) summarises how the various codes were grouped into these three themes, following the analysis of the interviews conducted across all stakeholder groups:

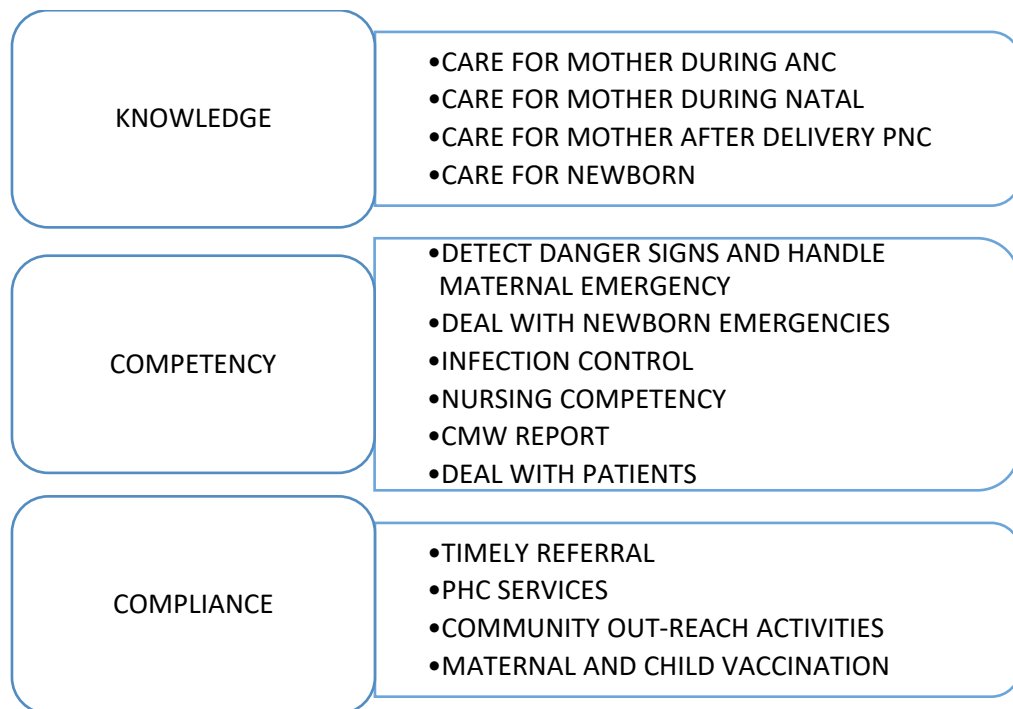


Figure 12 Identified Performance constructs

5.4.1 Knowledge

CMW knowledge emerged as key to performance measurement across all stakeholders. This is consistent with the findings of the systematic literature review that identified knowledge as one of the key construct measures of performance.

Specifically, CMWs should have an excellent working knowledge of essential and vital topics across maternal, child, and community health as a trained frontline health cadre entrusted to provide PHC services. One of the CMW's essential roles expressed by all stakeholders was the care of mother across antenatal, natal and postnatal care, as stated by the UNFPA country office-safe motherhood programme unit:

The knowledge of how to provide family planning, nutrition services, antenatal care (ANC), and delivery. They are the cadres that will provide comprehensive PHC right as we are talking about universal health coverage (UHC), so we are in one line with the government. They also provide other services (R4)

The CMW was also expected to know how to care for the mother during pregnancy, detect complicated pregnancies during antenatal care (ANC), manage a standard delivery, and detect early danger signs, such as mal-presentation and febrile puerperium.

5.4.1.1 Care for mother during pregnancy- antenatal care

All stakeholders identified the importance of CMW's knowledge of care during pregnancy as essential. They stated that the CMW is trained to deliver the basic package of care for all stages of safe motherhood.

Keeping the standard package of service for all the stages of the Safe motherhood is mandatory, especially ANC, which was identified as one of the gaps that we observed among village midwives (R2)

Accordingly, they stated that the CMW should know what to ask the pregnant mother in all antenatal care visits, what to look for during the clinical examination, including the laboratory investigations that should be requested, and to know the normal from abnormal results. Besides, they should be able to identify high-risk pregnancies, in the form of "early detection of complicated pregnancies," such as eclampsia cases or haemorrhage that should be detected

early to avoid complicated labour” and provide advice including “sending accurate messages to the pregnant woman.”

Having regular interactions and building trust with the mother was seen as a key component of the CMW task. As was working with the mother to develop the birth plan, as described in section 5.2, above. As a result, key informants and RH state coordinators suggested the following indicator be included in the performance measure: The number of antenatal care (ANC) or visits the CMW conducted within a given period.

5.4.1.2 Care for mother during delivery- natal

Also, all stakeholders stressed the essential role of the CMW in attending deliveries and basic knowledge associated with the delivery process. As described by senior CMW instructor, “so I would want her to be able to deal with normal delivery in a proper way.” Being able to deliver in the instance of a normal, or non-complicated labour, was also viewed as a key performance outcome by a senior instructor at Omdurman midwifery school:

Why did we say labour? I will give you a justification for each. Each midwife graduates after attending several deliveries and if she cannot deliver then she did not fulfil the requirements so there was a defect in mastering labour (R11)

To attend non-complicated deliveries, stakeholders stressed the importance of CMWs knowing the types of complications that can arise during labour and the major causes of maternal morbidity and mortality, as detailed for both mother and newborn, below.

5.4.1.3 Care for mother after delivery- Postnatal Care

The stakeholders identified the knowledge of what to ask for and look for after delivery and during postnatal care visits as vital characteristics of the CMW to prevent maternal morbidities and mortalities:

We come to postnatal care after a normal delivery, and all the complicated pregnancies result in febrile illnesses and infections during the puerperium period what to manage and know when to refer and provision of health care to the community. Puerperium febrile illness is also one of the competencies she is to master (R11)

5.4.1.4 Care for newborn

The CMW is trained and expected to care for the newborn, as stated by all the stakeholders. This care was considered important given the identified poor national neonatal, infant, and child morbidity and mortality indicators. Neonatal resuscitation was also considered essential and one of the basic requirements, emphasised by all stakeholders:

Critical and very important is the newborn, as again it's one of the unfinished MDGs agenda, where many countries have static or slowly decreasing neonatal mortality rates. So, to care and assess the newborn at those very critical hours right after the delivery is vital (R7)

The CMW is trained to assess the newborn status after delivery and resuscitate if needed and is shared by the beneficiaries as one of the key characteristics expected from CMWs. The CMW is further expected to care for the infant's nutritional status by advising the mother to exclusively breastfeed her child for the first six months, as per the WHO and national protocols, and as stressed by the health system stakeholders: "Even if you deliver, they show you how to breastfeed and care for the newborn, and when to introduce other food and water after six months" (FGD4).

5.4.2 Competency

The KI and RH state coordinators stated that CMW skills should be measured through the tasks they are asked to perform. As one key informant described, "the execution of their duties is at the heart of their performance." Competency was described by one of the key INGO stakeholders in RMNCH in Sudan as "knowledge and skills" with the professional union member, further emphasising that, "skills, of course, skills, attitudes should be measured and practice through the skills." This resonates with the systematic literature review, which returned competency as one of the components of performance sought for the measure of maternal health workers in LMICs. This was also reflected in the beneficiaries' view that "the characteristic that must be available in any CMW is to be smart and competent." Examples identified by stakeholders included infection control and prevention measures, demonstrating hand-washing, and newborn resuscitation as key indicators of CMW competency.

5.4.2.1 Detect Danger Signs & Handle maternal emergencies

All cohorts expressed the essential need of the CMW to detect maternal danger signs during labour, and this was emphasised by the RH expert and former director in the FMoH, "I would want her to detect the danger signs." Furthermore, the beneficiaries stressed this point during the focus group discussions, as evidenced by one of the participants when she said, "her ability to identify danger signs is essential" (FGD6).

Key informants and RH state coordinators expressed the importance of a CMW knowing when to refer complicated deliveries for emergency obstetric care (EmOC), as highlighted by the lead instructor in the midwifery school "Timely referral of cases whether emergency or complicated conditions, to identify when the newborn requires referral" (R11). Several key informants highlighted the importance of timely referral and stressed that the new CMW curricula should avoid the pitfalls of the previous VMW in this respect.

And to me, one of the key things that were of a critical gap in the VMW performance is the timely referral, so the identification and timely referral and I think this was the reason we lost many newborns (R2)

This implies that CMWs should be able to detect danger signs both during labour and in early pregnancy. Where, in the case of danger signs emerging during pregnancy, she should be able to put a delivery plan in place with the pregnant mother and to advise early referral, especially during the rainy season in autumn, as stated "If not already agreed on in the labour plan, she must refer her patient before the rainy season autumn and assist the husband" (R11)

As highlighted by stakeholders, the CMW is trained and expected to conduct specific duties when it comes to promoting, restoring, and managing community health in general, and specifically, mother and child health. She is trained to know how to act in emergencies, whereby "managing emergency cases is also one of the competencies," as well as provide first aid management of the main causes of maternal morbidity including sepsis, haemorrhage, and eclampsia, as stated by senior instructors in the central midwifery school in Omdurman when they indicated "first aid in case of haemorrhage emergency cases and to resuscitate a pregnant woman in emergency cases," as key competencies of CMWs.

In addition to knowing how to deal with emergencies and the leading causes of maternal morbidity and mortality, including eclampsia, haemorrhage, mal-presentation, and cord prolapse, referral to a hospital was identified as essential and one of the basic requirements, emphasised by all cohorts, including beneficiaries.

The characteristics that must be available in any CMW is to be smart and competent, for example during my delivery the foetus was not lying right, if I went to the doctor he would have done a caesarean section, but the competent midwife attending my delivery managed to do so being competent and smart, and both the baby and mother were fine. Competent means if she is faced by any emergency she can deal with it. She has to be competent and skilful in dealing with mal-presentation as breech and so forth (FGD6)

Competency is also described as essential in the context of Sudan where access to referral facilities becomes difficult during the rainy season

To have the ability to induce labour. She must know all this especially if she is faced with an emergency during autumn (the rainy season) because she can save the mother and child (FGD6)

Several factors cause high maternal mortality in the country including the delay in seeking, reaching, and finding appropriate healthcare as stated by key informants. Therefore, the training programme stresses early detection of danger signs and timely referral to the nearest health facility to ensure the healthy delivery of mother and baby. For this reason, participants voiced that they wanted to include "the number of timely referrals she conducted and reports as a proxy measure of her performance."

5.4.2.2 Handling of Newborns in emergencies

Stakeholders identified that the CMW training programme contains a helping baby breathe (HBB) course, and participants emphasised that this is one of the essential skills every CMW should perform to reduce of neonatal mortality rates. As stated by a senior instructor, "Helping Baby breathe instructors to train the midwives to resuscitate the newborn; I consider these the basic requirements for every midwife." Based on this, the mortality indicators of newborn, infant, or child can assess the performance of the CMW as a long-term measure. Therefore,

changes in maternal mortality ratio for the specific catchment area covered by the CMW also act as a long-term outcome of her performance.

5.4.2.3 Infection control

The CMW is trained on clean delivery; therefore, the number of sepsis cases for the mother or newborn serve as an outcome measure of her performance, as sepsis is the highest cause of maternal and infant morbidity. All stakeholders stressed that infection control is one of the main challenges arising during childbirth. As the head of one of the leading midwifery schools expressed, “that is exactly why we care much about infection control because it is the source of many problems, requiring each midwife to know it well.”

Specifically, infection control was considered one of the identified shortfalls of the previous village midwife (VMW) training. Risk of infection is particularly high within non-sterile environments, such as the home, where, in some states, up to 80% of the deliveries take place. Therefore, infection control and sterilisation were considered part of the essential duties of the CMW and given high emphasis in the training curricula as stated by the RH directorate at FMoH and CMW curricula development at the Academy of Health Sciences (AHS). One of the key INGO stakeholders highlighted the importance of proper handwashing in preventing infection in the first instance, which might arise during or after the pelvic examination (PV) and delivery.

The KIs and RH state coordinators stated that the CMW is trained to sterilise her equipment and that this forms a vital part of her competencies:

She is trained on the autoclave and hospital/facility setting procedures, the pot and boiled water for home delivery on the stove, firewood and boiling her equipment, and removal of infection/infection control (R11)

There was consensus that CMW should have a complete sterile delivery kit available and ready at all times, in addition to “her delivery kit present, her bag clean and equipment sterile and antiseptics always available.”

5.4.2.4 Nursing competency

The stakeholders stressed the importance of training the CMW on necessary nursing skills, such as taking vital signs, giving injections, administering intravenous (IV) fluids, and providing first aid for the community as a whole.

I would want her to have the nursing skills, which is basically why we shifted from the VMW to the CMW because there were a lot of necessary skills that if a VMW had been able to do, many lives would have been saved. So, again nursing skills and being able to deliver those services to women when in need (R2)

This was also identified as one of the village midwives' weak points, and stakeholders thought the new CMW should possess these competencies, especially under the PHC expansion programme, as stated above by the directorate of the RH at FMOH.

5.4.2.5 CMW Report

There was a large gap identified in the reporting system of the VMW, preventing the proper monitoring of the RMNCH within communities. Therefore, the new CMW cadre was trained on reporting and on how to generate the vital statistics that set the foundation for proper planning at the locality level. As described by the CMW curricula development committee, "Her training programme includes a compulsory module on reporting and registries. It's mandatory that she has to keep a CMW report on all her activities, including community-outreach". The CMW is also responsible for reporting death and birth notifications. The CMW report was thus identified by key stakeholders to reflect the cadre's performance within the community, demonstrating her knowledge and skills and documenting it.

So, the record of work is an important dimension to enable us to measure performance. I think the CMW reports herself about the difficulties and the challenges and how she deals with her duties could also entail some aspects of performance (R6)

CMWs are also trained to report on the activities they take part in, including the number of deliveries attended, timely referrals requested, community outreach activities, and other pre-set health system indicators. All of these, according to informants and RH state coordinators, indicate the CMW's productivity, which is another critical component of performance.

5.4.2.5.1 Number of deliveries

The number of deliveries, their outcome, whether eventful or not and the mode of management, according to the stakeholders, should all be reported in

the CMW report. These essential activities were also seen by key informants to be indicative of the productivity, and therefore the performance of the CMW.

Every midwife comes monthly, and you measure her performance by the number of deliveries she attended, did she face any difficulties in the deliveries. (R2)

5.4.2.5.2 Number of home visits

The key informants continuously highlighted the reporting function of the CMW and her monthly report. Accordingly, they suggested that since the CMW reports on the number and type of home visits she conducts, including the number of ANC visits, deliveries she attended, follow-ups, and consults, the follow-up should also be incorporated into the performance measure.

Literacy is one of the pre-requisite, and all CMWs undergo mandatory training on statistical reporting. Specially, the CMW is trained to register her activities as ANC visits, death and birth notifications, and health promotion activities. In addition to the challenges she faces within her duties, which could entail some aspects of performance. The stakeholders suggested the reporting system (i.e., the CMW Reports) be a modality for assessing performance and comparing vital indicators, such as IMR, MMR, and prevalence of endemic diseases such as malaria and typhoid, and incidence of HTPs, such as FGM/C. Specifically, they stressed the importance of monitoring indicators aligned to global targets, including the SDGs and national health indicators

One of the modalities that can be used to assess [performance] is whether this is a dramatic reduction in IMR, MMR neonatal part like reducing prevalence and incidence of endemic diseases malaria, typhoid, or unfortunate incidence of wrong and harmful traditional FGM/ FGC or what different. So, reporting system and already they are familiar with that (R3)

In this same vein, the maternal death surveillance and response (MDSR) were also suggested by one of the key informants from an INGO as a potential proxy indicator of performance, by identifying the maternal deaths and patterns and causes.

5.4.2.6 Dealing with patients/beneficiaries/clients

The stakeholders highlighted through the interviews, participatory workshops, and focus group discussions, the essential characteristics that they expect from every CMW they meet. The beneficiaries expressed the importance of CMW's positive attitude and strong work ethics. They expected her to show good manners, grace, and to be helpful, patient, understanding and to maintain patient-midwife confidentiality relationships, especially during antenatal care visits and delivery.

The beneficiaries during the FGDs described a competent CMW as one with "good manners, patience, and kindness, especially when in pain. She cares for you patiently and never rushes" (FGD1). Similarly, another FGD participant expressed:

Most importantly is for them (CMWs) to deal with you in a kind manner, to be graceful when dealing with you, very helpful and lively not like others who are very slow (FGD4)

The KIs and RH state coordinators identified that the attitude of the CMW towards her clients should be measured as part of the performance. It is also covered in the CMW curricula, with case scenarios presented from different parts of Sudan.

The beneficiaries, further highlighted the importance of the CMW being responsive to the patient's need and ready to serve when called for, maintaining the confidentiality and being considerate when charging for delivery fees as stated:

Whenever you knock on her door, she is ready, dressed, and her delivery kit present. She is stand by if a woman is ever in labour (FGD1)

She must keep secret and be considerate of the fees they charge! (FGD6)

5.4.3 Compliance

5.4.3.1 Compliance with Timely Referrals

CMWs need "to be able to decide to timely refer a woman and for the CMW to be able to take that decision to refer her." As further explained by the obstetrics and gynaecology council at the Sudan Medical Specialisation board, reflecting on his experience in the field

referral you know because midwives if they are well trained they refer at the appropriate time because as you know, the problem in this country is maternal mortality due to delays, so we have a delay in seeking care, in reaching care, in finding appropriate care and the midwife is part of the equation (R1)

Several key informants also considered the number of compliance with timely referral as a measure of performance. As in the past, the VMW, would not decide to refer patients, as they perceived it a sign of poor performance and inability to manage the case. Therefore, the CMW's compliance with timely referral is considered a measure of performance. This is best evidenced by one key informant when she stated, "even referral of patients all of these could be the ingredients of checking that there is a real performance" (R6)

5.4.3.2 PHC services

Stakeholders further discussed that CMWs must comply with all of her responsibilities and duties towards her community regarding PHC, including its core disciplines, health education, and sanitation. State coordinators further expect that the CMW will enhance community health promotion by establishing a community health committee that serves to quickly mobilise the community and send health messages, especially in areas where malaria is endemic, or to combat harmful traditional practices (HTPs),

Demanding from the midwife many things at different levels at the maternal, child, and household levels, including sending health messages to promote and prevent harmful traditional practices, what to eat and what to do with the change in lifestyle of the villages these things are essential. So, when we speak about a midwife's performance, I need her with such standards (R4)

The CMW is also expected to help raise awareness of environmental health and general health of the households:

She must be aware of all her responsibilities and duties towards her community regarding PHC including all its core disciplines; including health education and sanitation (R11)

5.4.3.3 Number of FGM/C cases

Fighting harmful traditional practices (HTPs) is one of the responsibilities of the CMW as she organises community outreach activities, reports on FGM/C incidence, and never conducts one. The importance of the CMW's compliance in light of the strong socio-cultural practices previously highlighted recommended to include "the number of harmful traditional practices in the village, including FGM/C," as a proxy for her performance (R3) Where the CMW in some cases would be asked to comply against the wishes and practices of her community/tribe, and she is expected to do so.

5.4.3.4 Number of endemic disease cases

The number of reported endemic disease cases the CMW managed within her community was also proposed as a proxy indicator of her performance and was suggested by several key informants. As a result, the number of people she treated with endemic diseases in the area was considered for inclusion in the performance measure.

5.4.4 Community outreach activities and counselling

The beneficiaries identified the CMW's performance level to be reflected by the essential counselling sessions conducted by the CMWs on the topics of antenatal care (ANC), family planning (FP), breastfeeding and baby's nutrition:

They guide and invite us to sessions in the health centre, so do the health visitors to provide counselling on antenatal care, breastfeeding and family planning

They tell us about the baby's nutrition and what we should feed the baby and not. We did not know better and fed them anything, but now we know what is nutritious, and our children are healthy, and we thank them for that (FGD1)

The CMWs also counsel the beneficiaries on STIs and HIV/AIDS and the importance of pre-screening. "Before this day, they counselled us on AIDS and told us of the importance of screening and how AIDS is spread, especially among pregnant women." In addition to maternal and child health, the CMWs conduct regular home visits, distribute impregnated mosquito bed nets when availed to prevent malaria, "We must thank them because during autumn (the rainy season) they distribute Impregnated Mosquito bed nets, so we do not get mosquito bites

to protect ourselves and our babies. (FGD1) Accordingly, when and if the health centre and the voluntary counselling test (VCT) facilities are available, does the CMW conduct the activities above. However, the unavailability and inconsistency across states was not included as an indicator in the tool.

5.4.5 **Maternal and Child vaccination**

Participants highlighted that in some states, such as Khartoum, the vaccination target for pregnant women- tetanus toxoid, newborn, and infants should be part of the CMW's performance measure.

I do not know about other states, but in Khartoum state, there is a vaccination target for pregnant women and newborns, and that is part of the CMW performance measurement; what percent of the vaccination target was covered per CMW per catchment area (R11)

It is for a short time to identify immunisation coverage, how many children were immunised, and how many women are immunised against tetanus (R3)

They highlighted that each CMW has a pre-determined immunisation target, as per the catchment area, and therefore this should be included as an indicator of performance. Nevertheless, this proposal was from one out of 18 states and not yet implemented in other states. Therefore, it was excluded at this stage from the tool.

5.5 **Performance measurement Modality**

This section describes the different performance measurement modalities proposed, the suggested frequency with which they should be measured, and the means. Both KIs and RH state coordinators firmly stated that no single measure is enough for performance measure. Instead, a comprehensive, multidimensional, cross-topic approach should be taken. This resonates well with the organisational psychologists' description of performance as something dynamic, behavioural, evaluative, episodic, and multidimensional (Campbell, 1990; Carlos & Rodrigues, 2016; Sonnentag & Frese 2002). Furthermore, they acknowledged that the measure of performance of a frontline community cadre is challenging and complex compared to assessing the performance of an individual assigned a

particular vertical or facility-based task (e.g., a lab technician performing a defined, controlled setting as a laboratory).

Additionally, the same stakeholders determined that the measure of performance should capture the knowledge, skills, and attitude of the CMW towards completing a pre-determined set of tasks. They also felt that special consideration to social and cultural aspects while measuring performance should be kept in mind. Finally, they highlighted the need to measure the individual performance of the CMW and measure the contextual environment of RH. In this way, they felt the measure would reflect the health system disparities and components for solutions to be tailored to the CMW's unique problems. The proposed national approach is in line with international practice, where the use of more than one measure of performance was identified while accounting for individual differences and contextual/situational perspectives, as well as performance regulation (Sonnetag & Frese, 2002).

Performance of a CMW, as determined by the KIs and RH state coordinators, should first be measured against her job description, what she should and should not do, and the extent to which she executes each item. Unfortunately, no specific job description or terms of reference was located as part of the desk review to inform the development of performance-related measures. In the long term, they proposed several sources that could be used to assess CMW performance, including the CMW, reports, PHC-level data, and other, existing forms of data collection and reporting (i.e., maternal death surveillance and response (MDSR)).

5.5.1 Measurement Standardisation

Despite the noted importance of performance measurement, the standardisation of performance measurement was a challenge due to the complexity of performance and the significant variations in the work environment within and between the country states, localities, and villages. As one senior level, HRD policymaker stated, "Performance is a complex area and measuring performance is always challenging, and especially in the context of Sudan it is a real challenge." This also comes in agreement with findings of the systematic literature review that further demonstrate the absence of a universal measure of performance among health workers and maternal health workers in LMICs in

particular. As such, key stakeholders, including an HRH national expert, expressed the importance of taking into account the significant variations in conditions and working environment within the Sudanese context that can work on obstructing the performance management system. "The idea of measuring the performance of two CMWs, both trained to provide healthcare services, where one is based in an ideal health centre, but the other in a disabling environment creates confounding factors that affect the measure and comparability of performance" (R6).

5.5.2 Performance Measurement Tools

In the more immediate term, key informants and RH state coordinators proposed several approaches to measure the performance of the CMWs, including quantitative and qualitative modes of assessment, consistent with the systematic literature review (see: Chapter 4). Questions, tests, and questionnaires were identified as key modalities of assessment. They argued that these should be posed alongside more observed assessments, including demonstrations and direct structured observation of the CMW in performing a task while third-part checks whether the steps taken are correct. International scholars further employed similar assessment modalities when measuring maternal health workers' performance in LMICs, as reported in Chapter 4. As one key informant from the UNFPA described, "She [CMW] comes and shows how she washes her hand, the prevention and control measures, how she conducts ANC or new-born resuscitation by demonstration to trained cadres" (R1)

Also, stakeholders recommended the use of checklists to assess the completeness of her midwifery kit. Participants also noted the punctual submission of the CMW's monthly report, accuracy, and items reported on, including birth and death notifications as another method to assess the CMWs performance:

We measure these characteristics by assessing and examining her [CMW] through the reports: its time of arrival, completeness and accuracy, observation of her delivery kit completeness, her behaviour, hygiene, and general appearance and all this through supervision (FGD8)

Supervision visits by RH state coordinators are, therefore, another important source of performance assessment. Unfortunately, due to the scarcity of resources, vehicles, and supervisors, the number of visits had decreased substantially in

recent times. Several KIs and RH state participants stated that the supportive supervision tool that was developed several years back and used to conduct supervision visits was beneficial, “if the proposed, existing supportive supervision tool was applied correctly, it will measure the technical performance of the CMW” (R12). However, the nationally developed tool, when reviewed and further discussed with key informants, showed its length and complexity.

5.5.3 Performance Measurement Assessors

The RH state coordinators identified the following personnel as most appropriate to conduct the assessment of the CMW's performance: Supervising health visitor and locality supervisor, assistant health visitor, and RH directorate. The same cohort acknowledged that an assessment coming from the CMW's direct supervisor at the PHC centre might introduce some bias, given that she either trained or worked with her. Therefore, it was agreed that another neutral body, as a supervision team from the locality, state, or adjacent state, should assess the CMW's performance. Performance measured from the community, including leaders and beneficiaries, were also proposed.

5.5.4 Performance Measurement Frequency

The RH state coordinators proposed that the performance assessment be administered every three months, specifically with regards to assessing CMW competency and productivity. However, if they were to measure the overall individual performance, they recommended once or twice a year would suffice, and key informants agreed with this.

5.6 Discussion

This consultative phase of the study provided a better understanding of the RMNCH landscape with regards to the PHC expansion programme. Notably, the interviews reiterated that the CMW cadre arose as part of this programme, and although funds were made available, several challenges remain. In the context of Sudan, the identified CMWs pre-requisites, determinants and components jointly proposed to measure performance, are illustrated below in Figure (13). Key informants considered availability, accessibility, and acceptability of CMWs as prerequisites for the performance of CMWs. Determinants of performance, as identified through the participatory interviews, focus group discussions and workshops, were categorised as being either contextual, from both the supply or

demand side of the health system, or individual/motivational factors. This is aligned to the situational/contextual perspectives reported within the performance literature, which focuses on work-place factors that either support or hinder performance, together with the individual differences consider examining abilities, personality and or motivation (Sonnetag & Frese, 2002).

Contextual determinants reflect the demand side of the health system that can influence the performance of the CMW, and include socio-cultural health beliefs, diet norms, access to clean water, taboos around family planning, financial hardship, choice of healthcare, and having previously experienced mistreatment from a health worker. These contextual determinants are specific to Sudan. The dietary norms and socio-cultural health beliefs reflect the unique ethnic diversity and taboos embedded within Sudanese society, negatively influencing health lifestyle choices. Access to clean water and financial hardship, identified as determinants, further impact on the choice of health care within Sudan, where health is a privilege.

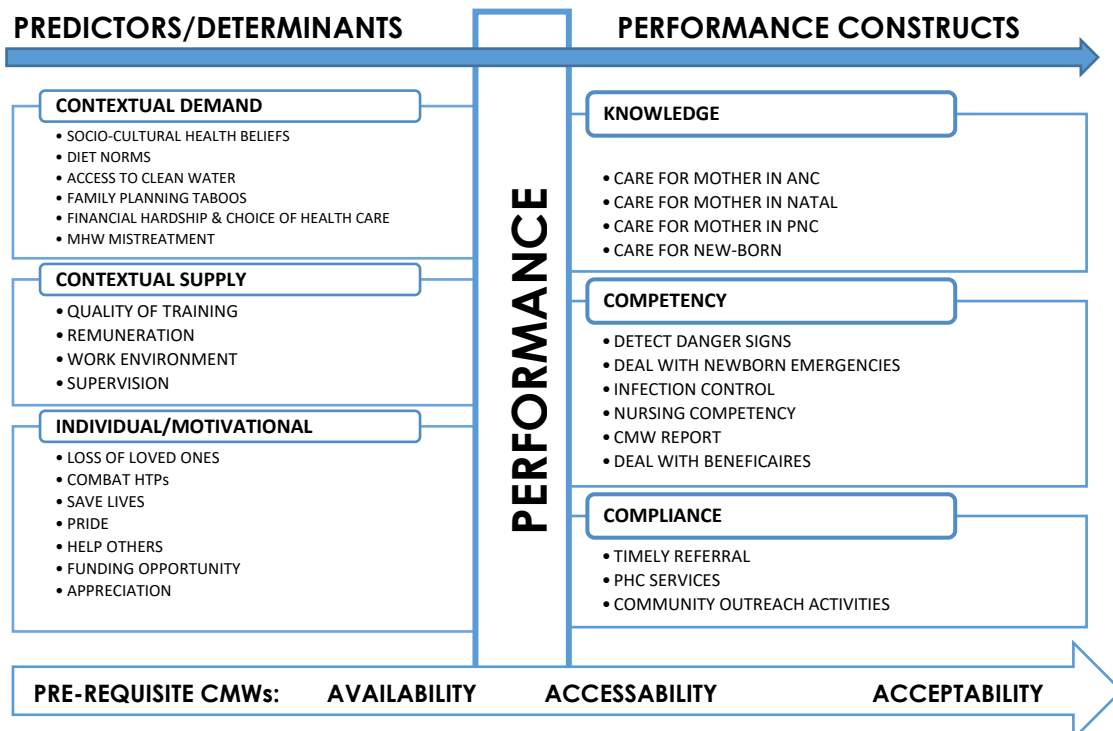


Figure 13 The identified CMWs precondition, determinants, components jointly proposed to measure performance

Contextual determinants also reflected the supply side of the health system, with key informants identifying remuneration, quality of training of the CMWs, work environment, including access to health facilities, and availability of consumables,

as determinants of performance. These factors further reflect the context of the health system in Sudan, where most of the frontline personnel do not receive a basic salary, or consumables, to perform their duties. The combination of the factors mentioned above mirror Happock's (1935) description of job satisfaction as spanning the psychological, environmental, and physiological conditions. They are furthermore aligned with Rue and Byars' (2003) description of job satisfaction, whereby workplace factors include working conditions and financial packages. Remuneration has also found to be a factor in the performance of health workforce in Harari Region in Eastern Ethiopia (Geleto et al., 2015). Likewise, Richards, (2011), also found work environment to impact on the performance of employees. Moreover, Squires and colleagues (2015) argued that though dissatisfied individuals may not necessarily quit their jobs, dissatisfaction may consequently impact on the quality of their performance.

Individual/motivational factors, on the other hand, included seven components that reflected the motivation of CMWs to choose this profession. These include pride, appreciation, funding opportunity, and happiness in helping others, saving lives, and combating harmful traditional practices. Many of these factors are also strongly reflected within the volunteer literature which also includes factors such as recognition which mirrors the concept of appreciation (Vitner, Shalom & Yodfat, 2005; Kemp, 2002; Soupourmas & Ironmonger, 2002; Clary et al., 1998) and altruism (Caissie & Halpenny, 2003) that drive people to help others (Cavalier, 2006). While, professional career development in contrast to existing literature (Andersen, 2003; Cavalier, 2006; Kemp, 2002; Sinclair, Dowson & ThistletonMartin, 2006; Clary et al., 1998) did not emerge as one of the factors in the case of CMWs in Sudan, which might be due to reasons, as the cadre, being somewhat new in context and the assistant health visitor promised as a career progress of highly competent CMWs not implemented yet. Also, harmful traditional practices are more context specific to Sudan, due to the adverse effects of practices as FGM/C on the communities the CMWs reside in.

Furthermore, the individual/motivational outcomes identified during this phase of the study can be further recategorised according to intrinsic and extrinsic motives, whereby the latter is linked to the desire to achieve a certain outcome or reward (Deci & Ryan, 1985) determining performance. Also, personal experiences, such as losing a loved one due to the unavailability of health personnel, further

drew CMWs into this profession. The geo-political climate, interacting dynamics, and reality shaped their life-decision in choosing the profession. These determinants are comparable to the individual difference determinants highlighted by Sonnentag and Frese (2002), which consisted of differences in personality, ability, and motivation.

The availability, acceptability, and accessibility of CMWs were further identified as prerequisites for the performance of CMWs. This is in contrast to Campbell and colleagues' who identified these as components of a health worker's performance within universal healthcare coverage (UHC)(Campbell et al., 2013; WHO, 2013b).

Stakeholders identified the performance of CMWs in Sudan as a combination of three primary constructs: namely, knowledge, competency, and compliance. Here, the 'knowledge' domain that emerged is consistent with Gagné's (1993) idea of declarative knowledge, or "knowing that something is the case, including the knowledge of facts, theories, events, and objects". In the current study, knowledge of antenatal, natal, postnatal and newborn care were considered essential and were consistent with the results of the systematic literature review, where the measure of basic knowledge emerged as a standard component of performance measure among maternal health workers in LMICs. Likewise, both the systematic literature review and the key stakeholder consultation process results identified similar knowledge items to measure, including essential antenatal, natal and postnatal care function, complicated delivery and adequate knowledge of newborn resuscitation (Goudar et al., 2013; Grady et al., 2011; Lakhani et al., 2016; Mirkuzie, Sisay & Bedane, 2014).

Also consistent with Gagné's idea of procedural knowledge, or "knowing how to do something which includes motor skills, cognitive skills and cognitive strategies" (Gagn1993; Kanfer & Ackerman,1989) was the emerging 'competency' theme highlighted by key informants of this study. Here, key informants stressed the importance of the CMW being able to execute several skills, including handwashing, neonatal resuscitation, and sterilisation of equipment. Whereas in the consultation phase of this study, skill was identified as a description of competency, the results of the systematic literature review identified competency and skills as separate constructs, whereby competency

was often used synonymously as a single construct of performance (Aragaw et al., 2015; Chaturvedi et al., 2014; Kildea, Larsson & Govind, 2012), and less frequently in conjunction with another constructs, namely knowledge (Young Mi Kim et al., 2013; Sheikh et al., 2016). As for skills, national stakeholders identified similar items under the skill construct including initial assessment, diagnosis, and treatment of mother and newborn (Traoré et al., 2014; Zhang et al., 2015).

Compliance was the third factor identified by key informants as a component of performance. This included compliance with timely referrals, PHC services, and community outreach activities, maternal and child vaccination. This widely resonates with the results of the systematic literature review, which identified studies where health worker compliance was measured through antenatal care services (Conrad et al., 2012) and health workers' interactions with clients (Kabo et al., 2016).

Unlike Hunt (1996) and Rotundo and Sackett (2002), key stakeholders did not identify counter-productive behaviour, self-confidence, or organisational stress as measures of performance. Other constructs as such as productivity and burn-out, were mentioned in varying degrees as measures of performance. Specifically, productivity was identified by a number of key stakeholders as health system indicators, while burnout was considered as relatively a new concept within the HWF context of Sudan.

Taken together, key informants and RH state coordinators agreed that to measure performance; measurement should use both quantitative and qualitative methods. Also, they expressed that it was important to consider both contextual and individual factors. This, again, is consistent with existing models, including Waldman's (1994) Theory of Work Performance and Mitchell's (1997) Model of Job Performance, both of which state that job performance is affected by person factors (i.e., individual differences) and systems factor (i.e., situational variables). A list of 11 potential domains, derived from both the systematic literature review, which initially identified 16 domains, and the formative study, which identified nine domains, as illustrated below in Figure (14), were thus presented to the second round of IR workshop participants to prioritise further and flesh out.

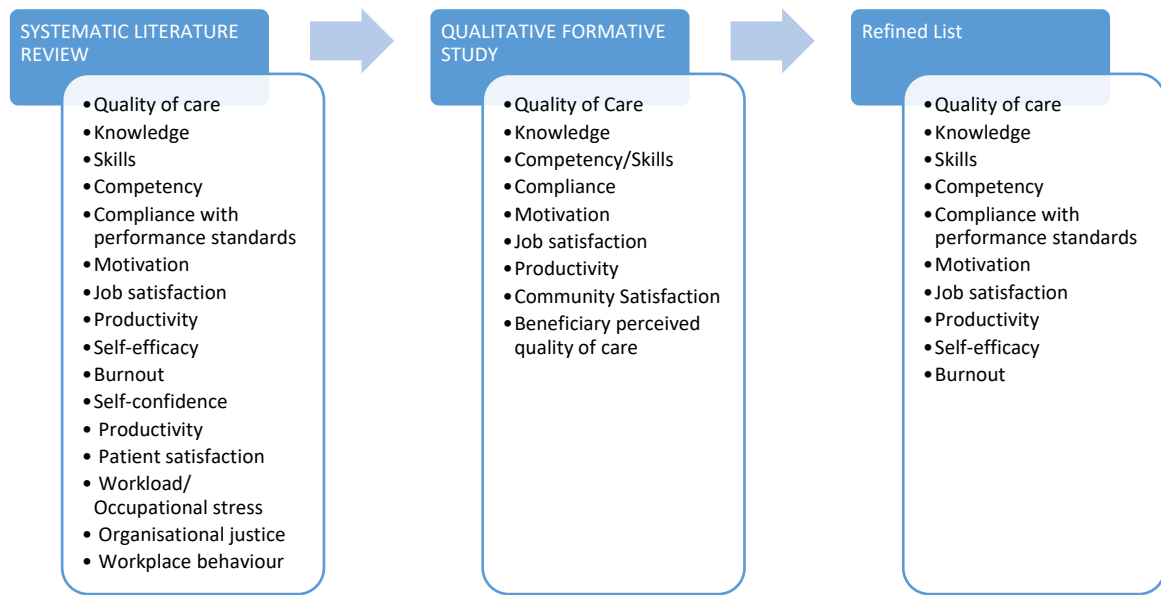


Figure 14 Process of performance identified domain

6 Chapter Six: Tool Development

Introduction

Following the empirical evidence used to identify performance-related constructs in the previous phase, this chapter presents the second phase of the research: the Tool Development Phase. Specifically, this chapter presents the results of the prioritisation exercise held during a second series of IR workshops. As described in Chapter 3 (section 3.3), heat-mapping techniques were used to generate agreement regarding which constructs identified during the exploratory phase should be used to measure the performance of a CMW in Sudan. In specific, this chapter presents the results of the focus group discussion conducted for each construct. Furthermore, it presents the results of how these focus groups were used to formulate the first round of test items within the initial version of the CMW Performance Tool, in fulfilment of the third research objective of the thesis.

6.1 Key Performance Constructs

6.1.1 Identifying Performance Constructs

As detailed in Chapter 3 (section 3.2), participants were the health system stakeholders that participated in the first phase of the study and the reproductive health state coordinators. In line with implementation research approaches and given the aim of the current study stemmed from a demand-driven approach, these stakeholders were considered key for the development of the scale. The second round of two participatory workshops was held in January 2018. The workshops firstly served to disseminate the findings of the systematic review (Chapter 4) and the qualitative participatory formative study (Chapter 5). Consistent with implementation research, which calls for the dissemination of findings throughout the lifecycle of the study, allowing stakeholders to reflect on the results of the first phase was considered key to the development of the performance measure.

The filtered list of 11 constructs was generated from domains most common within each approach, including quality of care, self-efficacy, compliance of

performance standards, and beneficiary perceived quality of care, burnout, motivation, and job satisfaction, productivity, competency, knowledge, and skills.

The workshops opened with these 11 constructs, which were presented to participants and subsequently discussed to generate a shared understanding of each one in Arabic, before commencing the prioritisation exercise. From these discussions, participants decided that the 'competency' construct should be comprised of both background understanding/comprehension and skills. These constructs were therefore adapted, and the total number of constructs brought forward for the prioritisation exercise was reduced to 9 constructs: quality of care, self-efficacy, compliance of performance standards, burnout, motivation, job satisfaction, productivity, and competency (i.e., comprised of understanding and skills).

The prioritisation exercise resulted in a total of five constructs being brought forward for further scale development. Both cohorts prioritised (i) quality of care, (ii) competency, as a composite of background understanding/comprehension and skills, and (iii) compliance. Also, Health System stakeholders prioritised the measure of (iv) motivation, while the RH state coordinators prioritised (v) job satisfaction as essential determinants of performance. Quality of care, competency, and compliance were the three highest-ranking constructs across both workshops. Productivity and self-efficacy were also among the constructs with similar average rankings. However, subsequent discussions found that self-efficacy was contextually challenging to translate and was often described in terms of competency and quality, or as "having both the competency to provide services of quality with confidence". Both groups of stakeholders identified 'burnout' as low priority. Therefore, it was decided to exclude a measure of burnout from the scale.

6.2 Theme Development

Themes were subsequently identified under each construct to aid in the development of items for each construct. To facilitate this, and as described in Chapter 3 (section 3.3), the second set of workshops was held in the tool development phase. The participants were divided into homogenous groups of

stakeholders for FGDs. In one workshop, FGD participants were a mix of RH, nursing and midwifery and HRH experts and FMoH officials, CMW instructors/head of training complex/curricula developers, UN agencies, and professional union. Another workshop with 13 of the 18 RH state coordinators was held in January of 2018. The RH state coordinators were grouped into groups of four, based on their geographical zones. While Sudan is a geographically big country with rich multi-ethnic, multi-tribal diversity, states within the same geographical zone were considered to bear the most similarity to one another. Each group was assigned a priority construct to develop further. Each group also assigned a rapporteur responsible for reporting back to the rest of the workshop attendants during plenary. The key themes emerging from each of the focus group discussions are described in greater detail below.

6.2.1 Quality of Care

Quality of care emerged as the construct with the most frequent score of 'highest priority' across both stakeholder groups. During the focus group discussions, quality of care emerged as a standard qualifier across all other constructs. For example, the adjective 'quality' was often used to describe other constructs of performance, "a CMW with quality of knowledge, quality of skills is of quality performance" (R13). Likewise, one of the senior RMNCH policymakers noted that "a competent CMW is one with quality of knowledge and skills." Compliance also emerged as an important theme within the 'quality of care' focus group. One participant best evidenced this when they expressed that, "a quality performing CMW, is one which complies with the rules, regulations, and protocols." Together, this evidences the understanding of the quality of care as a crosscutting element among stakeholders.

A second theme of 'communication' also emerged as a key feature of 'quality of care.' Accurately, how the CMW communicates with both beneficiaries and their supervisor. In the case of beneficiaries, communication was considered essential to building rapport and trust with community members, whereas communication with supervisors was considered particularly important in the case of the outcome of referred cases. The RH state coordinators further highlighted beneficiary satisfaction as an essential part of the quality of care. While key informants identified the frequency of changing or renewing the CMW's delivery

kit as a vital element of quality of care, the RH state coordinators stressed the importance of the availability of the delivery kit.

6.2.2 Competency

Both cohorts most frequently rated competency as a 'high priority' measure of performance. As previously mentioned, participants discussed competency as being comprised of both knowledge and skills, which emerged as key themes under this construct. In terms of scale development, key informants stressed the need to assess the required knowledge and skills for delivery and newborn care. Specifically, a competent CMW should *know how* to provide a high quality of care during labour/delivery, post-abortion care, and neonatal resuscitation, through strong knowledge of antenatal care (ANC), natal, postnatal care (PNC) and family planning (FP).

Additionally, a competent CMW was identified as one who knows how to recognise early signs of a high-risk pregnancy, knows when to make a timely referral in the instance of emergency and complicated cases, and knows how to manage uncomplicated pregnancies as well as labour emergencies. The RH state coordinators also emphasised that competent CMWs should know how to conduct an ANC examination, know how to make a timely referral in the case of an emergency, and an early referral in the case of a pregnancy requiring institutional delivery in addition to knowing how to disinfect equipment and other sterilisation techniques. Individually, the assessment of handwashing, the use and know-how of wearing gloves, proper medicine storage, and the use of anaesthesia were all critical skills for this theme. Well-performing CMWs were also expected to have competencies ranging across the social sciences, public health, ethics, and cultural competencies.

6.2.3 Compliance

Compliance was the third priority construct chosen by both groups of stakeholders. In specific, key informants identified compliance with the code of ethics and professionalism; delivering the integrated PHC package, which, apart from RH, also includes Integrated Management of Childhood Illness (IMCI), nutrition and outpatient care; the quality of compliance to the ante/natal/postnatal and new-born care service; all provided together with timely referral as key components of compliance. Also, the RH state coordinators

mentioned compliance with labour preparations for maintaining convenient aseptic labour, complying with infection control measures, educating households on family planning, and preventing mother-to-child transmission (PMTCT) counselling, and serving beneficiaries as thematic compliance areas to measure.

Referral, or "to be able to refer a woman timely; to be able to take that decision to refer her," was raised as an especially important issue within the IR workshops. The referral was considered a particularly important aspect of compliance, given the poor record of referral under the VMWs. As one participant explained, "VMWs did not comply to referral, either for unknowing, not complying to the protocol in measuring blood pressure (BP), or requesting haemoglobin level (Hb) test or urine general test and if so, not knowing the normal values or when to refer." Similarly, another KI highlighted that "it was documented that in the past, referring a beneficiary early on was understood as a sign of failure and incompetent midwifery skills."

The RH state coordinators further identified compliance with work standards and guidelines as an indicator of the quality of care. They specifically highlighted the importance of compliance with ANC and PNC guidelines as well as the management of ANC and PNC cases, as per the guidelines printed on banners and posters in the health facilities. The CMW's compliance with medicine prescription protocol and family planning counselling were also among the quality of care identified by the KIs.

In addition, the theme of 'reporting' emerged as an essential measure of quality compliance. Key informants specifically stressed the importance of maintaining complete and accurate records of births and deaths, the number of beneficiaries attending antenatal, natal or postnatal care, the number of high-risk pregnancy cases, and careful records of new-born and child follow-ups and vaccination. The timely submission of the records and monthly reports was also emphasised as a critical indicator of compliance. CMWs were also expected to comply with the development of the delivery plan, as agreed with the beneficiaries during ANC visits to prevent emergencies during labour, in the case of the CMW detecting a high-risk pregnancy, and to guard against economic hardship.

Finally, participants identified CMW compliance with the provision of community outreach activities, including quality health education and promotion activities, community participation in maternal and child services, and CMWs participation in immunisation campaigns as essential to her performance.

6.2.4 Motivation

Motivation was highly prioritised by key informants, where motivation was recognised as a key influencer, or determinant, of CMW performance. One key informant stated, "the more she is (CMW) motivated, the better she will perform." Both continuous professional development (CPD) and in-service training were considered critical motivational factors that could further enhance performance. Likewise, the role of an enabling work environment was identified as a motivational factor that further influences the performance of CMWs.

6.2.5 Job Satisfaction

Job Satisfaction was identified by the RH state coordinators as the fourth most vital construct to be assessed as a predictor of performance, whereby increasing a CMW's job satisfaction would lead to improvements in her performance. Given that the CMW depends heavily on support from the community, thematic areas thought to be indicative of job satisfaction included: the community's acceptance of the CMW, through her involvement in matters specifically serving women in the community; the CMW's employment status; and financial support from the community given that, in most states, the CMW does not receive a salary from the government. Finally, the availability of necessary equipment and an enabling environment with a designated area for service delivery were considered significant contributors to job satisfaction among CMWs. Nomination for training courses and regularity of supervision visits were also considered good indicators of job satisfaction.

6.3 Item Generation Phase

The themes and questions identified during the IR workshops were subsequently brought forward to the CMW expert group. As described in Chapter 3 (section 3.3), the CMW expert group is a group of key stakeholders; the majority are the key informants included in the previous phases and newly recruited stakeholders with the expertise and field experience of working with them CMWs.

Weekly consultation meetings held separately with each group member were used to develop, refine, and re-organise the items under each performance construct, based on a synthesis of the results emerging from the IR workshops. Items were also informed by the extant literature, including national grey literature and documents, such as guidelines and protocols identified during the desk review. Specifically, items under each construct were further developed based on the following resources: Safe Motherhood Protocol, In-service Training for Midwives, Supportive Supervision Protocol, and the National Reporting Format for Maternal Mortality and Morbidity.

Results from the expert group consultations resulted in several improvements and further developments of the CMW performance tool. Firstly, the expert group recommended presenting the items in such a way that they would “follow a continuum of care approach, from antenatal care to labour, postnatal care and community outreach activities” (*R2*), for both the mother and newborn. This decision was based on strong recommendations from several key stakeholders, including the RH directorate at the federal ministry of health (FMoH). The expert group further added a third construct, supervision, to the tool, as a third key determinant of performance. This decision was based on the acknowledgement that “supervision is key to the measure of performance, as with strong supportive supervision we can enhance the CMW's performance” (*R1*) and observe that in many states, supervision has decreased even stopped in some cases. One of the RH coordinators stated, “we used to conduct supportive supervision visits in the past, which helped us detect the CMW's performance weaknesses and address it accordingly.” This noted decrease in supervision was attributed to many factors, including scarcity of resources, such as fuel for transport and access to vehicles.

Finally, the expert group decided to repackage the ‘quality of care’ and ‘quality of care-communication’ constructs under the two constructs of compliance and competency. This decision was based on two key observations: Firstly, ‘quality’ was often used as a qualifier for other priority constructs, emerging as a crosscutting element to all constructs. Quality of care came out stronger from the SLR, and not so much from the stakeholder consultation part of the exploratory phase, as evidence for using both a combination of evidence-based and participatory approaches as a strength, rather than relied on the stakeholder

consultations alone. Secondly, and as demonstrated above, compliance was a key theme emerging within the quality of care focus group discussions.

6.3.1 Knowledge

The KI and RH state coordinators, as well as the CMW Training manual development committee, highlighted the importance of knowledge requirements. Knowledge questions consisted of check-listed test items, where the correct answer options were only available to the tool administrator. The items developed under the knowledge scale also followed the continuum of care model and included critical areas in both the CMW's training and job description, as informed by documents identified through the desk review, as national guidelines, protocol, and the CMW expert group. These items were self-reported, whereby a CMW would receive a score of "1" for every knowledge question answered correctly.

6.3.1.1 Antenatal Care

Antenatal care is considered the first necessary task for every CMW. CMWs are therefore taught, trained, assessed, and expected to have full knowledge of the number of minimum visits, the nature of each visit, how to develop a birth preparation plan, and the identification of high-risk pregnancies. Accordingly, the knowledge items developed corresponded to the minimum required ANC visit received by the beneficiary, the ANC visit examination, including early screening to test for high blood pressure, anaemia, diabetes, and infection, especially given the VMW's noted weak skills in doing so. Knowledge of testing cut-off points was also essential, referenced according to the safe-motherhood protocol and as advised by its unit. These items were posed in an open-ended format, with the interviewer ticking the correct responses, as stated by the CMW.

Knowledge of the birth preparation plan was also tested for here. Specifically, testing the CMW's awareness of key elements of the birth preparation plan including determining the place for delivery depending on the pregnant woman's status, saving money and goods, explaining the importance of institutional delivery, advising clients to arrange for transport to a health facility and its associated cost, identifying a co-patient and child-minder, advising the mother to prepare clean clothes to use as vaginal pads, and to advise the mother to

prepare clean clothes to bathe, dry and cover the newborn with. Items were again posed in an open-ended format, with the interviewer ticking the correct responses, as stated by the CMW.

One of the most vital roles of the CMW is the knowledge to identify high-risk pregnancies. This was not only stated by the KI and RH state coordinators but was further fleshed out during the consultative meetings with the expert group and evidenced in the safe-motherhood protocol and in-service training manual. Specifically, the CMW should have complete knowledge of types of high-risk pregnancies requiring institutional delivery. As, the age of mother (<14 and >35 years old), multipara (>6 deliveries), multiple pregnancies (twins, triplets), eventful previous delivery accompanied by extensive haemorrhage, previous caesarean section, malpresentation of foetus (after 32 weeks), poor obstetrical history, documented history of uterine tear from the third stage of labour, primigravida, last delivery was stillbirth or died within the first day, eventful previous delivery accompanied by convulsions, and eventful previous delivery assisted by forceps.

6.3.1.2 Natal Care

With regards to natal care, KI and RH state coordinators clearly stated the critical importance of a CMW's knowledge of danger signs during labour that require an immediate referral, and which are the leading causes of maternal morbidity and mortality, as per the safe motherhood protocol. Identified cases requiring immediate referral after labour include extensive vaginal bleeding, shock, high blood pressure, eclampsia, and severe abdominal pain. The KI and RH state coordinators further identified several natal emergency cases considered crucial for the CMW to manage before referral and to require emergency delivery first aid care. Member of the expert group, the INGO CMW national technical adviser, and a senior obstetric and gynaecologist suggested this knowledge be assessed using three emergency scenarios, each representing what may arise during delivery eclampsia, cord prolapse, and breech presentation. The CMW would then be asked how she would provide first aid across these three scenarios. CMWs were trained on the management of these cases. Therefore, questions were structured and phrased based on the CMW curricula and training.

In the case of eclampsia during labour, knowledge was demonstrated by the CMW correctly describing that she would turn the mother to her side with the

extension of the head, put a tongue depressor or spoon to ensure a clear airway, inject 5mg of magnesium sulphate every 4 hours for 24 hours and refer to hospital. In the case of umbilical cord prolapse, knowledge was demonstrated by the CMW correctly describing that she would retract the umbilical cord into the vagina, decrease the pressure on the umbilical cord by assuming a knee chin position and gently retracting the umbilical cord with her fingers until arrival to the hospital.

In the instance of a breeched delivery, knowledge was demonstrated by the CMW correctly describing that she would cleanse the area, conduct an episiotomy, prepare two clothes for the newborn and deliver the head in a state of complete flexion. Questions were posed in an open-ended format, with the interviewer ticking the correct responses, as outlined in the steps above.

As stated by KI and RH state coordinators and documented in the in-service training guidelines, in addition to caring for the mother, the CMW is also responsible for caring for the newborn. As a result, one of the CMW expert groups, a senior health visitor and co-author of the safe motherhood protocol, advised adding questions to balance maternal and newborn care and further test the CMW's knowledge regarding newborn care. Accordingly, the item 'How do you measure the physical condition of a newborn?' was added, with the correct response including reference to assessing activity/muscle tone, pulse, response to stimulation, appearance, and skin coloration.

6.3.1.3 Postnatal Care

Postnatal care was also one of the main components stated by the KI and RH state coordinators. Three items were further developed based on the participatory workshop, on the advice of the maternal and child health (MCH) directorate, and the CMW training curricula and safe motherhood protocol. The first item covers PNC examination visits done for both the mother and baby during the first visit, whether by observation, physical examination, or health education. The question 'What do you do in the PNC visit?' was preceded by a question on the compliance of postnatal care and the number of visits.

The CMW was expected to inspect the mother, including her general appearance, vital signs, puerperium discharge, examine the uterus, and examine any wound, external genitalia. With regards to the baby, a CMW is expected to inspect vital signs, the newborn's ability to defecate and urinate, check the

umbilical cord, its ability to breastfeed, movement, and colour, including signs of jaundice. This was followed by the item: 'How do you counsel for postnatal care for the mother and baby?' CMW knowledge of counselling for the mother was assessed by her knowledge to counsel for personal hygiene, nutrition, mobility and movement, mother's supplements (i.e., vitamin E, folic acid), and family planning. CMW's knowledge of counselling for the baby was assessed by her knowledge to counsel for breastfeeding and immunisation.

Other postnatal care items, developed to test the CMW's knowledge of danger signs indicative of postnatal complications for early referral and management included 'Which cases require immediate referral during puerperium?' Knowledge was indicated by a CMW's response of extensive secondary vaginal bleeding due to uterine infection, foul and coloured (green-yellowish-green) vaginal discharge, episiotomy suture infection, and fever (puerperium fever with its causes). Finally, the item developed to test the CMW's knowledge of family planning methods on which to counsel the new mother during PNC visits included 'What are family planning methods?' Family planning methods known by the CMW should include natural methods, the mini-pill, combined pills, injection, male condom, implant, and intrauterine devices (IUDs). Here again, questions were posed in an open-ended format, with the interviewer ticking the correct responses.

6.3.1.4 Knowledge Items

In sum, the knowledge items identified and prioritised by stakeholders were based on shortfalls identified among the VMWs as well as the leading causes of maternal morbidity and mortality. Ultimately, the first draft of the knowledge subscale included 13 items as a measure of performance: 4 items measuring knowledge of antenatal care (Qs1, 2, 4 and 5), five items measuring knowledge of natal care (Q7, 11, 12, 13 and 14), and four items measuring knowledge of postnatal care (Q16, 17, 18 and 21). These items are summarised in Table (26), below.

Table 26 Knowledge Scale Items

Q No.		Question
Q1	K1	How many ANC visits are there?
Q2	K2	What do you do during ANC visit, after taking history and examination
	K2a	Measure BP
	K2b	Refer to the health facility BP 110-140/60-90
	K2c	Request Hb
	K2d	7-11 prescribe medication and Refer to health facility <7
	K2e	Request Urine general
Q4	K3a	How do you conduct birth preparation plan counselling? Determine the place for delivery dependent on pregnant women status
	K3b	Save money and goods
	K3c	Explain the importance of institutional delivery
	K3d	Advise client to arrange for transport to health facility and its cost
	K3e	Identifying a co-patient and child-minder
	K3f	MOTHER: Advise the mother to prepare clean clothes to use as vaginal pads
	K3g	BABY: Advise mother to prepare clean clothes to bathe, dry and cover the new born
Q5	K4a	What are the high-risk pregnancy cases that require institutional delivery? Age of mother < 14 AND >35 YEARS
	K4b	Multipara (>6 deliveries)
	K4c	Multiple pregnancy (twins, triplets)
	K4d	Eventful previous delivery accompanied by extensive haemorrhage
	K4e	Hospital: Previous caesarean section
	K4f	Mal presentation of foetus (after 32 weeks)
	K4g	Bad obstetrical history
	K4h	Documented History of uterine tear from third stage of labour
	K4i	PHC level: Primigravida
	K4j	Last delivery was still birth or died within the first day
	K4k	Eventful previous delivery accompanied by convulsions
	K4l	Eventful previous delivery accompanied by assisted by forceps or vacuum
Q7	K5a	Which cases require immediate referral after labour? Extensive vaginal bleeding
	K5b	Shock
	K5c	High blood pressure
	K5d	Eclampsia
	K5e	Severe abdominal pain
Q11	K6a	How would you manage an eclampsia case in labour Turn the mother to her side with extension of the head
	K6b	Put a tongue depressor/ or spoon
	K6c	Ensure airway
	K6d	Inject 5mg of magnesium sulphate every 4 hours for 24 hours

	K6e	Refer to hospital
Q 12	K7 a	How would you manage an umbilical cord prolapse? Retract the umbilical cord the vagina
	K7b	Decrease the pressure on the umbilical cord by assuming a knee chin position
	K7c	Gently retracting the umbilical cord by fingers until arrival to the hospital
Q 13	K8a	How would you manage a breech delivery? Cleansing the area
	K8b	Episiotomy
	K8c	Preparing 2 clothes for the new-born
	K8d	Delivering the head in a state of complete flexion
Q 14	K9a	How do you measure the physical condition of a new-born? Activity/Muscle tone
	K9b	pulse
	K9c	Response to stimulation
	K9d	Appearance/ Skin coloration
	K9e	Respiration
Q 16	K10a1	What do you do in the PNC visit? a- Inspect the Mother: general appearance
	K10a2	vital signs
	K10a3	puerperium discharge
	K10a4	examine uterus
	K10a5	Examine wound/ external genitalia
	K10b1	b- Inspect Baby: Vital signs
	K10b2	Ability to defecate/ urinate
	K10b3	Umbilical cord
	K10b4	Ability to breast feed
	K10b5	Movement
K10b6	Colour/ Jaundice	
Q17	K11a1	How do you counsel for postnatal care for the mother and baby? a- Mother: Personal Hygiene
	K11a2	Mother's nutrition
	K11a3	Mobility/ movement
	K11a4	Mother's supplements Vitamin E
	K11a5	Mother's supplements fefol
	K11a6	Family planning
	K11b1	b- Baby: Natural breast feeding
	K11b2	Immunisation
Q18	K12a1	Which cases require immediate referral during puerperium? Extensive secondary vaginal bleeding due to uterine infection
	K12a2	Foul and coloured (green- yellowish green) vaginal discharge
	K12a3	Episiotomy suture infection
	K12a4	Fever (puerperium fever with its causes)
Q 21	K13a	What are family planning methods? Natural
	K13b	Mini-Pill

K13c	Combined Pills
K13d	Injection
K13e	Male Condom
K13f	Implant
K13g	IUD

6.3.2 Compliance

Several items were identified as essential indicators of compliance throughout the continuum of care, with 11 items included in the tool's first version. The compliance items identified by key informants included measures of quality of care and items were based mainly on the importance of CMWs complying with the preparation of birth plans (n=1), timely and appropriate referrals (n=5), postnatal care (n=2), family planning (n=1) community outreach (n=1), and reporting (n=1). The compliance answers were formulated as either self-report or as test questions (i.e., with correct/incorrect answers), whereby the interviewer would tick the number of correctly endorsed responses to a specific question and would receive a score of "1" for every compliance question answered correctly, based on a list of answers informed by the documents identified through the desk review, as national guidelines, protocol, and CMW expert group.

6.3.2.1 Preparation of birth plans

Different sources emphasised the importance of the CMW, helping beneficiaries to put together a Birth Preparation plan, as an essential part of the antenatal consultation process. Namely, the birth preparation plan was mentioned by most of the key informant at the federal and state level and appeared in both the community midwife's training curricula and the in-service training for midwives' guidelines. Therefore, an item on the Birth Preparation plan (Do you conduct birth preparation plan counselling?) was included as a measure of compliance.

6.3.2.2 Timely and appropriate referrals

A second aspect emerging from the focus group discussion on compliance was the importance of issuing timely and appropriate referrals in the instance of high-risk pregnancy detection. While 'referral' was predominantly discussed in terms of complicated or emergency cases, referral for high-risk pregnancy was also considered an essential part of ANC compliance. The lack of referrals made

by VMWs was also served as a strong rationale for adding referral of high-risk pregnancy cases as an indicator of compliance among CMWs. As a result, a self-report measure of ANC referral was added (i.e., Did you refer an ANC case before?), followed by asking the CMW to recall the reason(s) they referred to their last case. As per the safe-motherhood protocol, high-risk pregnancies should be assessed once a beneficiary is confirmed as pregnant, or during one of the CMW's earlier visits.

Referral of emergency cases during labour was another critical element of compliance for CMWs and something they would have been extensively trained on, as evidenced by the CMW training curricula. As one key informant explained, "referral in emergencies is clearly outlined in their job description and constitutes an integral part of the training." An item measuring compliance with these referral practices was therefore derived by the Safe-motherhood unit within the RH Directorate of the FMoH, as an essential element of compliance to prevent complicated deliveries, as a key cause of maternal morbidity and mortality. Complying with referral requirements was considered necessary as an indicator of performance given that the CMW operates at the community level, in her home, or at the beneficiary's home, both of which lack essential emergency obstetrical care services and resources (i.e., Oxytocin). Finally, compliance during postnatal care was emphasised by the Maternal and Child Health Directorate, along with other key informants, as another essential item to be included in the performance tool (i.e., How many postnatal care visits did they attend? And when were they attended?). Individually, whether the CMW complies with the structured number of PNC visits, each one with its degree of importance, in line with the Safe-motherhood protocol and in-service training guideline, was considered essential to assess as a measure of compliance.

6.3.2.3 Community outreach

In cases where the community is hard-to-reach, the CMW is often the only health care provider. For this reason, CMWs are trained in the delivery of basic PHC package, which includes several important community outreach activities. As one of the CMW expert group members explained, "one of the roles of the CMW is to provide health care services to the mother, newborn, and rest of the community members at PHC and community level." This is also reflected in the CMW training

curricula guidelines and, as identified by the primary health care expansion programme directorate.

The most important activities include participating in immunisation campaigns, distributing insecticidal treated nets (ITNs), and conducting health education seminars on various topics, including family planning, and especially harmful traditional practices (HTPS), such as female genital mutilation (FGM). Therefore, three different indicators of community outreach were included as a measure of compliance. Namely, “Do you conduct family planning visits?” and “What activities do you perform in the community?”. These items were self-reported, whereby a CMW would receive a score of “1” for every community outreach activity performed (family planning, immunisation campaigns, health education seminars, and ITN distribution) for a maximum of 4, or 100% compliance on this item.

6.3.2.4 Reporting

The human resource development directorate at the FMoH described the current health information management system in Sudan as ‘weak.’ Among other reasons for the weak system, and as described by a member of the CMW expert group, was “the low literacy rate of VMWs.” As one recalls from Chapter 5 (Section 5.1), these low literacy rates were also one of the reasons why the education criteria for the new CMW cadre were set at a minimum of secondary school.

Moreover, and to build more reliable health information systems as a key health system building block, CMWs are expected to comply with pre-determined reporting criteria, as described in the reporting and statistics module of their CMW training curricula and the Safe-motherhood protocol. These are comparable to the reporting indicators set by more extensive programmes, including national demographic health surveys (DHS) and aligned to global indicators, including the SDGs.

As outlined in the CMW training manual, and as stressed by the monitoring and evaluation unit of the RH directorate, CMWs are expected to complete monthly reports, which are to be submitted at the locality level, to their supervising health visitor (HV). Several stakeholders identified accurate and periodic reporting of her activities as reflecting productivity of the CMW and compliance with her job standard operation procedures/ToRs. Key indicators from the CMW report were

thus translated into items in the initial version of the CMW Performance Tool. Namely, the number of ANC visits made, the number of folic acid or iron supplements distributed, the number of deliveries attended, the number of postnatal care visits made, in addition to the number of referrals and family planning methods distributed (typically, oral contraception and male condoms).

The CMW expert group also mentioned that CMWs are trained and have been given the responsibility of issuing birth and death certificates and, therefore, should keep adequate records of how many births and deaths occurred in their catchment areas. All items pertaining to the CMW report were presented in checklist format, whereby the CMW was asked to name the indicators on which she reports (i.e., "What do you report on in the CMW report?"). Answers were therefore self-reported, whereby a CMW receives a score of "1" for every indicator she would report on (ANC including iron and folic acid, deliveries, PNC, ANC/Natal/PNC referral, family planning methods distributed-pills/male condoms, mother and new-born death/cause/date and PHC centre linked to, for a total possible score of 8 or 100% on this compliance measure.

6.3.2.5 Compliance Items

In sum, the first draft of the compliance sub-scale, as a measure of performance, consisted of eleven items: one item assessing compliance with assisting beneficiaries with birth planning, five questions on referral compliance, one question on complying with the correct amount of PNC visits, two questions on community outreach, two questions on compliance with reporting practices. These items are summarised in Table (27), below. The scoring measures vary from either self-report, where the CMW answers with a yes or no answer, to asking the CMW to list as many correct responses as possible. Accurate options are available to the interviewer who completes the answers by ticking the boxes corresponding to the CMW's responses.

Table 27 Compliance Scale Items

Q No.		Question
Q 3	CE 1	Do you conduct birth preparation plan counselling?
Q 6	CE 2	Did you refer an ANC case before?
Q 8	CE 3	How do you treat emergencies occurring during labour?
Q9	CE 4	Have you referred a case before?

Q 10	CE 5	If yes, describe the last case you referred: <input type="checkbox"/> Extensive vaginal bleeding <input type="checkbox"/> Shock <input type="checkbox"/> High blood pressure (blurred vision) <input type="checkbox"/> Eclampsia <input type="checkbox"/> Severe abdominal pain
	CE 5a	a. Where did you refer this case to? <input type="checkbox"/> PHC Centre <input type="checkbox"/> Hospital <input type="checkbox"/> Other
	CE 5b	b. Was this an appropriate referral location for the case? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Q 15	CE 6a1	How many post-natal care visits are there? And when? a- Number of visits? CMW reports 4 visits
	CE6 b1	b- 6 hours after delivery
	CE6b2	3 rd day
	CE6b3	6 th day
	CE6b4	After 40 days
Q19	CE 7	Have you referred a case before?
Q 20	CE 8	Do you conduct family planning visits?
Q 22	CE 9a	What other activities do you perform in the community? Immunization campaign
	CE9b	Health education seminars
	CE9c	Distribute ITNS
	CE9d	Other
Q 23	CE 10	Do you keep a CMW report?
Q 24	CE 11a	What do you report on in the CMW report? Number of cases
	CE11b	ANC (Iron and folic acid)
	CE11c	Deliveries
	CE11d	PNC visits
	CE11e	Referral (ANC-Natal-PNC)
	CE11f	Family Planning Method (pills- male condom)
	CE11g	Mother and new born mortality /cause of death/ date
	CE11h	PHC centre CMW linked to

6.3.3 Competency

Several items were identified as essential indicators of competency throughout the continuum of care. Items were identified through the desk review and consultative process while based mainly on the importance of knowledge and skills. Competency items mostly fell under the themes of infection control, neonatal resuscitation, knowledge of danger signs, and how to refer for services subsequently, and contents of the CMW's Maternal Kit.

6.3.3.1 Infection Control- Hand wash

As described by key informants and RH state coordinators during the IR workshops, infection control is one of the critical items to be measured as part of performance. Similarly, and as described by one of the CMW experts, "Maternal sepsis, among the leading causes of high morbidity and mortality, could be prevented at an early stage through maintaining aseptic conditions and correct hand-washing procedure for both a normal para-vaginal (PV) examination and delivery." Therefore, knowing how to correctly hand-wash was considered an essential item under the competency sub-scale.

Given the observable nature of this practice, it was decided that this item would be best measured through direct observation by the interviewer, or performance measure assessor, and scored on a scale of 1-5, with 5 being the perfect hand-washing technique. Possible scores ranged from very poor (=1), poor (=2), fair (=3), good (=4) to very good (=5). The correct hand-washing method was based on the CMW training program and senior instructor and locality health visitor of Khartoum North. The CMW scored one if she applied the soap bar to a cupped hand and lathered well. She scored an additional point for rubbing her hand palm to palm with the right palm over left dorsum with interlaced fingers and vice-versa. If she rotationally rubbed, her left thumb clasped in right palm, and vice versa, she was given an additional point. Additional points were given if she rotationally rubbed backward and forwards with clasped fingers of the right hand in left palm and vice versa. A final point was given if she rinsed her hands with water and dried them thoroughly. The CMW was given an extra score of =1 for each of the following steps, a total of 5 maximum points.

6.3.3.2 Infection Control- Wear Gloves

Another important aspect of infection control is the consistent and proper use of gloves, as previously described by key informants and emphasised by RH state coordinators during the participatory workshops. CMWs would have been trained on proper glove use during their training, as outlined in the CMW training guidelines. Therefore, it was decided that CMWs would be asked to demonstrate the steps in wearing and removing gloves, as per a specific procedure.

This task would also be scored by direct observation, using a scale of 1-5, with 5 being the perfect glove-wearing and removal technique. Possible scores ranged from very poor (=1), poor (=2), fair (=3), good (=4) to very good (=5). The correct glove-wearing and removal steps were derived from the Safe-motherhood protocol and senior instructor at Omdurman midwifery training complex, with each step earning a score of one point, for a maximum of five points. Furthermore, the correct steps involved removing all her jewellery and hand inspection for sores and abrasions and ensuring sleeves were rolled up to the elbows (1 point). An additional point was scored if she picked up the glove with the dominant hand by touching the inside cuff of the glove and did not touch the outside of the glove, while pulling the glove completely over her dominant hand. A third point was given if she inserted the gloved hand into the cuff of the remaining glove and pulled the remaining glove on the non-dominant hand, inserting her fingers while adjusting and keeping hands interlocked, away from clothing and above her waist and below her shoulders. Additional points were also allocated wherein the removal of gloves, the CMW grasped the outside of the cuff or palm of the glove and gently pulled the glove off, turning it inside out and placing it into the gloved hand. She scored a final point when she took the ungloved hand, placed her fingers on the other glove, and pulled the glove off inside-out.

6.3.3.3 Infection Control- Equipment sterilisation

Equipment sterilisation, as identified by KIs and RH state coordinators, was identified as key to maintaining aseptic conditions both during and after labour and considered an essential component of infection control. As described by senior CMW instructor, equipment sterilisation was considered "all-important and interlinked with infection control too, because, in most of these villages, there is no infection control equipment." As the CMW operates at the community level,

where an autoclave is often unavailable, the CMW training manual outlines that she should sterilise her equipment in different stages using essential disinfectant solutions, boiling equipment, and for a specific duration. Therefore, the MCH Directorate, senior instructor, and national midwifery expert considered ensuring that the CMW could demonstrate the correct competency in terms of equipment sterilisation as essential to measuring their performance.

Consistent with the other competency items, CMWs were asked to demonstrate the steps in equipment sterilisation. This task was also scored by direct observation, again ranging on a scale of 1-5, with 5 being the perfect infection control and equipment sterilisation. Possible scores ranged from very poor (=1), poor (=2), fair (=3), good (=4) to very good (=5). Each step was based on the in-service training manual and senior instructor at Khartoum North and Gedarrif state midwifery training complex. She is given a point for each of the following steps: a total of five maximum points:

1. Rinsing utensils with running water
2. Scrubbing utensils with a special brush
3. Diluting the mixture of antiseptic to wash utensils
4. Separating the utensils that need to be sterilised with water after boiling temperature
5. Carefully repacking utensils back into the Midwifery Kit

6.3.3.4 Newborn resuscitation

Newborn care was considered as one of the key areas highlighted by both key informants and RH state coordinators, given that neonatal mortality rates were high, and not showing signs of decreasing. Newborn care was also an area identified through the desk review, as outlined in the: 10 in 5 Strategy, RMNCHA Strategic plan (2016-2020), and Safe-motherhood protocol. The RH directorate further noted the poor neonatal resuscitation skills among the village midwives and that CMWs had been trained on the helping baby breathe model for neonatal resuscitation. This is based on neonatal resuscitation as a cost-effective and scalable approach to preventing neonatal mortality.

After consulting the integrated management of childhood illness (IMCI) unit at the RH Directorate of FMoH, the decision was made to have CMWs demonstrate newborn resuscitation on a manikin. Both a research assistant and I

underwent newborn resuscitation training with a certified trainer from the IMCI unit, and a manikin was loaned for testing the performance scale. The neonatal resuscitation item was also scored by direct observation, again on a scale of 1-5, with 5 being the perfect neonatal resuscitation demonstration. Possible scores ranged from very poor (=1), poor (=2), fair (=3), good (=4) to very good (=5). Each correct step was granted a score of "1", with steps determined based on the CMW training manual, input from a Paediatrician, and a Helping Baby Breathe (HBB) senior instructor. The CMW was scored 1 per step enlisted below for neonatal resuscitation. She was given a point for each of the following steps, for a total of five maximum points:

1. Drying the baby thoroughly and keeping the baby warm
2. Checking equipment/mask: the testing function of bag and mask and making sure the mask fits the baby's face
3. Applying the mask to make a firm seal: extending the head, placing the mask on the baby's chin then over its mouth and nose
4. Ventilating the baby at 40 breaths per minute
5. Looking for chest movement by checking that every ventilation breath produces chest movement and improving ventilation. If the chest does not move, reapplying mask and repositioning the head and mouth-clearing secretions and opening the baby's mouth.

6.3.3.5 Midwifery Kit

The KI and RH state coordinators stressed that "the CMW should know all necessary items in her delivery/maternal kit." The CMWs also stressed that her competency can be measured and demonstrated by the completeness of the kit and that this reflects her capability in maintaining a complete kit. The CMW was asked about the essential items in her midwifery kit and given a score of '1' per essential item she listed. The list was generated from the CMW expert group and reference to the Safe motherhood in-service training and CMW curricula and in line with the UNICEF guidelines². The items were as follows: essential drugs (e.g., oxytocin), renewable medical supplies (e.g., scissors), medical equipment (e.g., syringes), essential sterilisation, and resuscitation equipment.

² https://www.unicef.org/supply/files/Midwifery_Kit.pdf

6.3.3.6 Nursing skills Measure Vital signs

All stakeholders acknowledged the importance of measuring the necessary nursing skills among the CMWs, especially in her ability to take vital signs including, “measuring BP and pulse rate as the nursing skills that were deficient in the past VMW cadre” They were identified as non-invasive procedures that are life-saving if accurately taken. Accordingly, CMW measuring two of the three vital signs was assessed, including body temperature, heart rate, and blood pressure. Each CMW was scored a full 2.5 marks if she accurately took the vital sign and gave the right reading. Any failure led to the loss of part of the mark.

6.3.3.7 Competency Items

In sum, the draft competency scale consisted of six items. Three items assess their competency on directly observed measures of infection control. One item assesses their competency with newborn resuscitation. One item assesses the ability to read and measure vital signs and assess the competency of what should be in the Maternal Kit, as outlined in Table (28). Six stations were ultimately set following a continuum of care approach to allow the CMW to demonstrate the chosen six competencies. The interviewer would ask the CMW to demonstrate handwashing. After completion, she would be scored based on the criteria and then asked to go to the next station to demonstrate how to wear and remove standard/surgical gloves. The CMW would then be asked to demonstrate a newborn's resuscitation, followed by equipment sterilisation, the midwifery kit items. In the final station, the CMW was asked to measure two of three vital signs, demonstrated on the assessor.

Table 28 Competency Scale Items

Q No.		Question: How well does the CMW demonstrate:	Very poor	Poor	Fair	Good	Very Good
Q 25	CY1	How they wash their hands?	1	2	3	4	5
Q 26	CY2	How they wear gloves and take them off?	1	2	3	4	5
Q27	CY3	New-born Resuscitation?	1	2	3	4	5
Q 28	CY4	Sterilise their equipment?	1	2	3	4	5
Q 29	CY5	Knows the essential items in her Midwifery Kit?	1	2	3	4	5
Q 30	CY6	Measure vital signs (BP, PR, Temp)	1	2	3	4	5

6.4 Developing Job satisfaction and adapting existing measures of Motivation and Supervision as Determinants of Performance

The Job Satisfaction scale was developed during the participatory workshops and consultative debriefing meetings. As for supervision and motivation, existing measures of perceived supervision (Vallières et al., 2018) and motivation to help (Weinstein & Ryan 2010) were presented to the CMW expert group, as described in Chapter 3 (section 3.3). These scales were revised and subsequently adapted to the Sudanese context, as explained in greater detail below.

6.4.1 Job satisfaction

Job satisfaction was one of the top priority constructs chosen by the RH state coordinators as a key predictor of performance. The job satisfaction scale was the adapted Minnesota Job Satisfaction questionnaire (Weiss, Dawis & England, 1967) to include further several items, based on the consultative process. The first five items developed in the job satisfaction scale addressed satisfaction with support from third parties, including satisfaction with working for the government, receiving incentives from the government, being granted community funds for side-projects, support from community leaders, and the community. As previously discussed in Chapter 5, CMWs have yet to be deployed in most of the states. As stated by the PHC expansion programme directorate, only three states have rolled out the CMW programme. Therefore, the RH state coordinators felt very strongly about adding these items to measure elements of their satisfaction with more organisational factors and given that they believe this dramatically influences performance.

An item to measure 'your inclusion in issues having to do with women in the community' was added by RH state coordinators, and was later further refined through the consultative meetings with the expert group. The rationale for this, they explained, was that the inclusion of the CMW at community level further reflects the community's acceptance of the CMW, especially by the head of the village, therefore, directly impacting on her performance. Next, RH state coordinators wanted to include an item measuring the CMW's satisfaction with her professional

development or training. They strongly emphasised the importance of training opportunities as a sign of CMWs receiving appreciation from their employer.

KI and RH state coordinators further explained that nominating CMWs or health cadres for training in general, acts as a form of incentive, as they are given days off, a training/refresher opportunity, and sitting allowance. Therefore, the RH state coordinators also added the following item: training opportunities. Another three statements were added that aimed to measure satisfaction with workplace factors. These included satisfaction with the necessary working conditions and prerequisites, such as the 'availability of equipment and supplies', 'the availability of water and electricity needed to work,' and the 'availability of drugs for patients. The latter includes local anaesthetics, medicine, and consumables. These conditions were considered particularly important to a CMW's job satisfaction, and as stated by RH directorate, "the midwifery kit is only renewed once a year, and it falls upon the CMW to purchase the required consumables and medicine" (R2). It was known that CMW is burdened with these expenses, due to scarcity of resources at the PHC facility, and that she often covers the cost from her income. The RH state coordinators felt very strongly about the addition of these three statements as key indicators of job satisfaction, further explaining that their unavailability would hinder CMW performance.

The last five statements of the CMW job satisfaction scale were adapted from the Minnesota Job Satisfaction Scale (Weiss, Dawis & England, 1967). The scale was translated and modified to measure RMCH workers in LMICs (Weiss et al., 1967; Cagan & Gunay, 2015; Oncel, Ozer & Efe, 2007). These items intended to capture more general job satisfaction. They included 'the amount of challenge in my job'; 'the amount of job security I have'; 'overall, I am very satisfied with my job' and intrinsic job satisfaction factors, such as 'the opportunity to use my abilities in my job' and 'satisfaction that I accomplish something worthwhile in this job.' The expert group, through the consultative meetings, further agreed to these additional items.

Ultimately, the first draft of the job satisfaction scale comprised 15 items, as summarised in Table (29). These items are scored (i.e., on a Likert Scale), with items ranging from 1-5, where one is 'very dissatisfied,' and five is 'very satisfied.' The

responses were self-reported. The scale was initially designed as a single job satisfaction measure, where a higher total score indicates greater job satisfaction.

Table 29 Job satisfaction Scale Items

Q No.		Question	Very dissatisfied	Dissatisfied	Fair	satisfied	Very satisfied
Q1	JS1	Working for the government	1	2	3	4	5
Q2	JS2	Incentives from the government	1	2	3	4	5
Q3	JS3	Community Funds for Projects	1	2	3	4	5
Q4	JS4	Support from Community Leaders	1	2	3	4	5
Q5	JS5	Support from the Community	1	2	3	4	5
Q6	JS6	Your inclusion in issues having to do with women in the community	1	2	3	4	5
Q7	JS7	Training opportunities	1	2	3	4	5
Q8	JS8	Availability of equipment and supplies	1	2	3	4	5
Q9	JS9	Availability of water and electricity needed for my work	1	2	3	4	5
Q10	JS10	Availability of drugs for my patients	1	2	3	4	5
Q11	JS11	The amount of challenge in my job	1	2	3	4	5

Q12	JS12	The amount of job security I have	1	2	3	4	5
Q13	JS13	Overall, I am very satisfied with my job	1	2	3	4	5
Q14	JS14	The opportunity to use my abilities in my job	1	2	3	4	5
Q15	JS15	That I accomplish something worthwhile in this job	1	2	3	4	5

6.4.2 Perceived Supportive Supervision

The perceived supervision scale was added as a key predictor of performance, based on the results of both the IR workshops and at the proposal of the CMW expert group. As detailed in Chapter 5 (section 5.2), the construct was strongly mentioned during plenary discussions in both IR workshops. Perceived supportive supervision was measured using a modified version of the Perceived Supportive Supervision Scale (PSS) (Vallières et al., 2018). The PSS was chosen as it was initially developed and tested to be reliable and validated to measure perceived supervision among community health workers (CHWs) across seven low and middle-income countries. Given its noted use with frontline health workers across multiple, similar, LMIC settings, the scale was considered to have good cross-cultural validity. Furthermore, the short 6-items of the PSS were easily translatable.

The original items of perceived supervision (PSS) asks about one's perceived regular contact with their supervisor, two-way communication, and joint problem-solving elements. However, the CMW expert group debriefing sessions advised excluding one item from the original PSS scale, "My supervisor is a good communicator," because although it was translatable, yet all KI and CMW expert group thought it did not read well given the current country context, cultural background, and cadre under study. Therefore, items included in the initial version

of the scale, as a measure of supervision, were reduced to five. These items, their scoring guides, and their administration modes are summarised in Table (30). These items are scored (i.e., on a Likert Scale), with items ranging from 1-5, where one is 'very dissatisfied,' and five is 'very satisfied.' The responses were self-reported. The CMW asked to answer this about their supervisor at the PHC level, which in some instances might be the locality RH.

Table 30 Perceived Supportive Supervision Scale Items

Q No		Question	Very dissatisfied	Dissatisfied	Fair	satisfied	Very satisfied	Measurement mode
Q 16	PS 1	My supervisor meets with me regularly	1	2	3	4	5	Self-report
Q 17	PS 2	My supervisor meets with me regularly to discuss problems and solutions	1	2	3	4	5	
Q 18	PS 3	My supervisor takes into consideration my views and ideas	1	2	3	4	5	
Q 19	PS 4	My supervisor appreciates me	1	2	3	4	5	
Q 20	PS 5	My supervisor helps me to update my knowledge	1	2	3	4	5	

6.4.3 Motivation

Motivation was also considered a high priority among health system key informants and predominantly emerged under the 'individual performance factors' theme in the exploratory phase. Therefore, it was included as one of the scales, as a determinant of performance. Motivation was measured using Weinstein and Ryan's (2010) Motivation to Help Scale developed for volunteers. This scale was chosen as in many cases, and similar to volunteers, CMWs provide their services free of charge. The scale is comprised of 11 items, six of which measure autonomous motivation (AM), and five measure controlled motivation (CM). Based on self-determination theory, Weinstein and Ryan's, further described AM as "those motivations with an internal perceived locus causality." These are thought to bring greater benefit to both the helper and recipient than CM, which is defined as "those motivations that have an external perceived locus of locality" (p 222-244). The CM items and AM items are summarised in Table (31) below.

The scale items were reordered based on the CMW expert group consultative meetings advice and were adapted to the local context, culture, and narrative. Specifically, the item statements were re-arranged such as to start with the autonomous motivation items; therefore, the positively phrased statements were relisted to appear before the negatively phrased statements. These items are scored (i.e., on a Likert Scale), with items ranging from 1-5, where one is 'very dissatisfied' and five is 'very satisfied'. The responses were self-reported.

Table 31 Motivation Scale Items

Q No.		Question:I work as a community midwife:	Very dissatisfied	Dissatisfied	Fair	satisfied	Very satisfied
Q1	AM 1	Because I like acting this way	1	2	3	4	5
Q2	CM 1	Because I feel I should	1	2	3	4	5
Q3	AM 2	Because I enjoy it	1	2	3	4	5
Q4	AM 3	Because I care about the women in	1	2	3	4	5

		my community					
Q5	CM 2	Because I feel I have to	1	2	3	4	5
Q6	CM 3	So that I would be liked	1	2	3	4	5
Q7	CM 4	Because others would get mad at me if I didn't	1	2	3	4	5
Q8	AM 4	Because I value doing so	1	2	3	4	5
Q9	CM 5	Because I would feel like a bad person if I didn't	1	2	3	4	5
Q10	AM 5	Because I think it is important to act this way	1	2	3	4	5
Q11	AM 6	Because I appreciate that my help could be useful	1	2	3	4	5

6.5 Other Design Considerations

The CMW Expert group, including the directors of both the PHC expansion programme and RH directorate, advised that items of job satisfaction, perceived supervision, and motivation scales be asked last within the tool. This decision was thought to allow for rapport to be built with respondents, first, before asking the CMWs about their supervisor, motivation, and satisfaction in their work. In other words, this decision was made in the hopes of reducing acquiescence. After the cognitive testing, the tool was further revised based on the respondents' feedback, debriefing session with a research assistant, and feedback from the CMW expert group.

6.6 Performance Tool Cognitive testing

The tool also went through two rounds of cognitive testing, with two cohorts of CMWs, as detailed in Chapter 3. This testing was based on the cognitive model of the response process across four areas: comprehension, retrieval of information from memory, judgment, and response to the question.

The concept of Job Satisfaction was new to the CMWs and required explanation. The concept is culturally challenging as the CMWs saw that they should be grateful to Allah for his giving and blessings, rather than identifying their needs and knowing their fundamental rights, from deployment, to availability of essential equipment, consumables, and facility to conduct her job correctly. The idea of asking about or rating one's satisfaction with components of one's work was in stark contrast to religious ideals that one should be grateful to Allah for all things, good and bad. Such constructs imported from Western settings are interpreted/translated in a different manner. Many CMWs felt grateful to be chosen by their community to enrol in the CMW program. They portrayed themselves as community leaders, having been empowered and with a high sense of responsibility. Some of the CMWs considered purchasing the consumables needed for their work as their duty, unaware on some occasions of their right to obtain these materials from health centres, free of charge. Others chose to still pursue this career despite the low, but only convenient income.

The Motivation concept was also new to the CMWs, requiring explanation. Given the status of the CMW as a lower cadre, frontline health worker, and given their low-socioeconomic status, more generally, CMWs reported having never been asked to reflect on motivation statements before. This may also be reflective of the human resources management system, as the CMWs, frontline health workers specifically, and allied health workers in general, as employees or affiliates of the public system, do not undergo performance appraisal, team building, or retreats.

Contextually, the strong family bonds within communities generate a sense of responsibility towards one's extended family. CMWs, therefore, find it their duty to take care of each other. Therefore, efforts were required to familiarise CMW with the concept of motivation. Furthermore, these statements took longer to administer than the measures of performance present earlier on in the tool. These consultative rounds of cognitive testing led to further revisions to the tool, including changes to the Likert scales.

CMWs had varying experiences and had been trained across different midwifery schools. Active probing was conducted to answer the specific questions concerning the problems identified when administering Job satisfaction and

Motivation sub-scales. The researcher read the sub-scales out loud and discussed with the participants the meaning of both constructs. The participants were then asked: what they understood of the concept, what they understood of the question/statement, what it meant to them if any of the statements needed to be re-worded or omitted

In general, CMWs tended to answer with a positive, neutral, or negative option of the Likert scale. The cognitive testing phase, therefore, revealed that most CMWs tended to answer items on the motivation and job satisfaction scales as either 1 (strongly disagrees), 3 (neutral), or 5 (strongly agree). This led to further consultation with the literature, my thesis supervisor, and an external expert on maternal health in Sudan, the latter with ethnographic and tool development expertise. In contrast, the CMW expert group advised these scales to be presented using a 3-point Likert scale instead, i.e., positive, neutral, or negative option. The second round of cognitive testing resulted in the decision to use smiley faces as a five-point scale. The use of smiley faces was considered particularly translatable given the widespread use of emotions in popular forms of telecommunication (i.e., WhatsApp, SMS messaging).

6.7 Discussion

Aligned to implementation research, participatory and consultative processes were used in this second phase of the research to generate the items of the initial version of the Performance Measurement Tool. Out of the 16 constructs identified from the systematic literature review and the consultative process with key stakeholders, the highest-ranking constructs prioritised by the key informants and RH state coordinators were narrowed down to six. Although quality of care was the most highly prioritised construct used to measure performance, it was ultimately considered as crosscutting all other components of performance in this context. Other constructs such as self-efficacy, identified by both SLR and the participatory exploratory study, when further discussed, were deemed too difficult to translate contextually. Burnout was among the constructs that, although identified during the KIs, was not ultimately retained as a high priority during the heat map exercise. The terminology was considered alien to the Sudanese context, at least among frontline health workers who voiced a lack of clarity around what burnout meant.

The final, initial scale, therefore, consisted of six constructs, three of which were intended as measures of performance (competency, knowledge, and compliance) and three of which were considered important determinants of performance (supervision, job satisfaction, and motivation). The preliminary tool, therefore, consists of 59 item statements, whereby 28 questions assess the measures of performance and 31 questions measure the determinants of performance.

Many of the items developed as part of this process were consistent with those used by others to measure performance across similar constructs in similar contexts. This was the case across measures of knowledge, competency, and compliance. However, none of the tools identified through the SLR identified all these constructs as a single measure of performance between determinants and indicators, nor did they apply the different methods in one measure.

Unlike other measures of maternal health workers' performance in low and middle-income countries (LMICs); the knowledge items developed as part of the consultative process followed a continuum of care approach. Antenatal care, for example, was reviewed by many scholars (Ohnishi, Nakamura & Takano, 2007; Sheikh et al., 2016; Ratcliffe et al., 2016; Goudar et al., 2013; Walker et al., 2015) who assessed midwives' knowledge of primary antenatal care (ANC) functions. They also included measures of uterine fundus and assessment of foetal lie and presentation. Unlike other studies, the items developed as part of this study further included knowledge of the number of ANC visits, vital signs during pregnancy, delivery plan, and high-risk pregnancies. Studies measuring maternal health workers' knowledge in the natal period (Chandhiok et al., 2015; Duysburgh et al., 2013) at primary health care (PHC) also assessed knowledge of the main complications of obstructed labour, haemorrhage, and hypertensive disorders, as well as childbirth care.

Similarly, the items identified in this study included the most common emergency cases during labour: haemorrhage, cord prolapse, breech delivery, and pregnancy-induced hypertension. Like other studies, it was proposed to test the CMWs knowledge via vignettes/problems of the cases. Postnatal care within home visits or at a health care facility (i.e., health care within 42 days after delivery) was also measured by Chen and colleagues (2014). Knowledge of family planning

has also been included as a measure of performance elsewhere (Diedhiou et al., 2015). In the current study, the items developed included an examination of PNC for both mother and newborn, where the CMW was asked an open-ended question, and based on the tool; the interviewer would tick the right answers.

The compliance items developed were similar to those used by (Conrad et al., 2012; Kabo et al., 2016; Pitchforth et al., 2010) to measure maternal health provider's compliance in LMICs. In their multi-country study, Conrad and colleagues (2012) measured compliance to antenatal care services as the registration, history taking and examination, testing, counseling, and education of pregnant women. Other items in the current study's measure of compliance included referring to high-risk pregnancy, emergency labour or postnatal conditions. Also, compliance in providing family planning counselling and community-outreach activities was included as one of the main items reflecting the core nature of the community midwife. Similarly, Kabo and colleagues (2016) measured compliance by assessing and monitoring compliance to standards, developed based on national protocols and guidelines.

Consistent with existing literature, competency was included as key to performance measurement among CMWs in Sudan. Although some scholars measured competency as the sole performance construct (Aragaw et al., 2015; Chaturvedi et al., 2014; Kildea, Larsson & Govind, 2012; Traoré et al., 2014; Zhang & Fan, 2015), nationally, the stakeholders described competency as reflective of both background understanding and skills as part of performance.

Items measuring competency were largely developed to be assessed by a third party, whereby the CMW is asked to demonstrate a skill, observation and qualitatively, through the use of case-vignettes (Chaturvedi et al., 2014). This approach stands in contrast with others who assessed competency via self-assessment (Kildea et al., 2012). Similar to others (Conroy et al., 2015), neonatal resuscitation was identified as a key indicator of competency in this study. Like [Goudar et al. \(2013\)](#), the use of case-scenario simulation allowed the CMW to demonstrate the helping baby breathe (HBB) steps of neonatal resuscitation by using a manikin. Similar to other studies, the CMWs were also asked to demonstrate delivery instrument sterilisation steps and the wearing and removal of gloves, as infection control measures to prevent septicaemia.

Several scholars have also measured job satisfaction of maternal health workers in LMICs (Cagan & Gunay, 2015; Geleto, et al., 2015; Kruk, Pate & Mullan, 2017; McAuliffe et al., 2009; Oncel, Ozer & Efe, 2007; Rabbani et al., 2015; Sadodin et al., 2016; Adegoke et al., 2015). While the current study developed some job satisfaction items, like Cagan & Gunay (2015) and Oncel et al., (2007) the current study also adapted some items of the Minnesota Job Satisfaction scale (Weiss, Dawis & England, 1967) to assess internal and external job satisfaction levels among nurses and midwives. The job satisfaction scale developed in this study, as a part of a participatory process, generated similar items to Geleto et al. (2015), using a Likert scale to reflect remuneration or pay, working conditions, professional autonomy, access to needed supplies, and access to professional development opportunities as indicators of job satisfaction.

Supervision was planned to be assessed using traditional measures, including checklists and observations, as initially stated by the KI and RH state coordinators, and as put forward by the supervision manual. However, and following plenary discussions with both the KI and RH state coordinators, it emerged that assessing complementary and supportive approaches was preferable than assessing traditional approaches as a positive determinant of performance. The inclusion of supportive supervision is consistent with a growing body of literature describing supportive supervision approaches as key to health worker performance (Frimpong, 2011; Hill et al., 2014; McAuliffe et al., 2013; Willis-Shattuck, 2008).

In contrast to the current study, motivation of maternal health workers in LMICs was identified by key stakeholders as a determinant, rather than a construct of performance (Chandler et al., 2009; Morrison et al., 2015; Nguyen Thi Hoai et al., 2015; Prytherch et al., 2012; Morrison et al., 2015; Nguyen Thi Hoai et al., 2015), commonly measured via mixed-method approaches, such as interviews, FGD and questionnaires (Morrison et al., 2015; Nguyen Thi Hoai et al., 2015). Motivation is also assessed by adapting existing scales (Mbindyo, Gilson & English, 2009), as was the preferred approach identified in the current study.

Several different modalities emerged from the systematic literature review (Chapter 4) and the exploratory phase (Chapter 5) as potential methods to measure performance, including a tool to be completed by the CMW's supervisor,

as a self-reported MCQ, as vignettes or case studies, or as open-ended questions. In the current study, however, it was agreed that the tool would be administered in an interview format as a combination of open-ended, non-leading, observational, and test questions. This approach is consistent with those applied by many scholars when attempting to measure maternal health workers' performance in LMICs, often using quantitative, qualitative, and mixed-method approaches. Specifically, quantitative tools such as questionnaires, scales, observational checklists, and case-vignettes are among the most common tools used by scholars. A similar approach applied in the current study was preferred to allow for a universal, replicable, and unbiased measure that could generate similar results irrespective of the interviewer.

In conclusion, this chapter presents the results of the participatory consultative process of prioritising the primary constructs identified to measure performance. Of the 16 constructs identified from the systematic literature review of the performance literature of maternal health workers in LMICs, only six constructs were ultimately included as a priority measure of CMW performance in Sudan, with three of these serving as measures of performance determinants. In Sudan, CMW performance is, therefore conceptualised as a combination of knowledge, competency, and compliance and determined by job satisfaction, perceived supervision, and motivation, as illustrated in Figure 15 below. This process resulted in each item developed under each construct, as well as the question modality reflecting the contextual understanding of Sudan's performance. The resulting tool was then brought forward for testing in the final phase of the research: The Testing Phase.

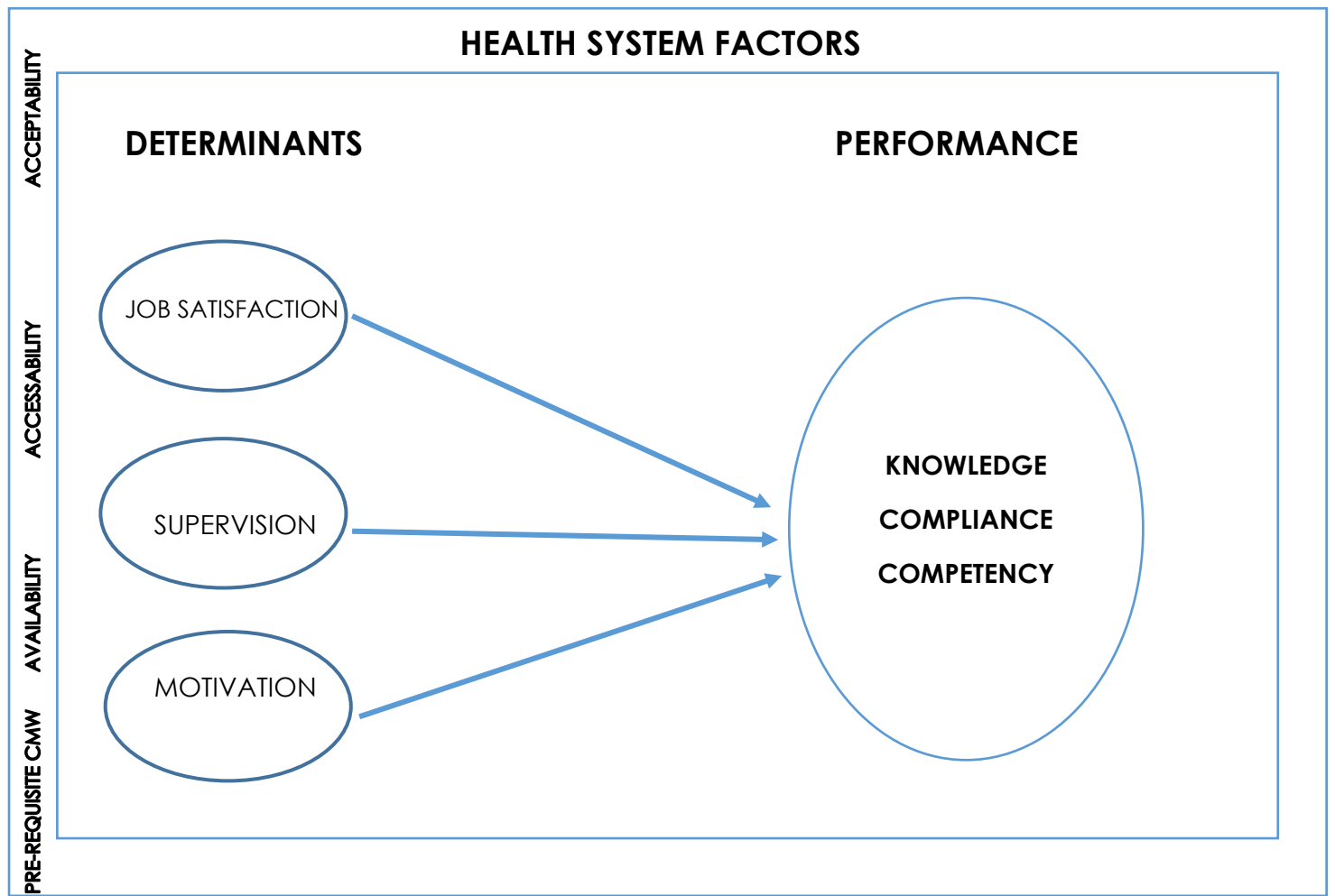


Figure 15 Revised Performance Model

7 Chapter Seven: Tool Testing

Introduction

This chapter presents the results of the testing phase of the initial CMW Performance Measurement Tool and is presented in three sections. The first section presents the findings of the exploratory factor analysis of the performance measures, or the items developed to measure performance directly. The second section presents the results of the factor analyses performed on the scales measuring determinants of performance: Job Satisfaction, Motivation, and Perceived Supervision. Whereas the results of exploratory factor analysis are presented for the newly developed job satisfaction measure, results of two, independent, confirmatory factor analyses are presented for the previously validated measures of Perceived Supervision and Motivation. Finally, the results of these latent structures are then combined into a regression model to identify the relationships between determinants of performance and performance, as per the theoretical framework presented at the end of Chapter 6.

7.1 EFA of Performance measures

7.1.1.1 Kaiser-Meyer Olkin Measure of sampling adequacy (KMO)

Given the limited knowledge of the factorability of the newly developed performance measure scale in the context of Sudan, the suitability of the data for factor analysis was first assessed using principal component analysis (PCA) before carrying out an exploratory factor analysis (EFA). The 28-items of the performance scale were analysed using SPSS version 24. As presented in Table (32), the KMO value of .784 exceeded the recommended value of 0.60 (Kaiser, 1974), and Bartlett's Test of Sphericity reached statistical significance of ($\chi^2=1345.998$, $df=378$, $p=0.000$). Taken together, these results support the factorability of the correlation matrix. Further inspection of the communalities matrix depicted in Table (33) revealed that all coefficients were above 0.4.

Table 32 Results of the KMO and Bartlett's Test for the performance scale

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	1345.998
	df	378
	Sig.	.000

Table 33. Table communalities

Communalities		
	Initial	Extraction
Q1	1.000	.460
Q3	1.000	.497
Q6	1.000	.536
Q8	1.000	.588
Q19	1.000	.677
Q20	1.000	.801
Q23	1.000	.748
Q25	1.000	.726
Q26	1.000	.787
Q27	1.000	.710
Q28	1.000	.641
Q29	1.000	.594
Q30	1.000	.670
Q2	1.000	.589
Q4	1.000	.668
Q5	1.000	.577
Q7	1.000	.658
Q11	1.000	.513
Q12	1.000	.748
Q13	1.000	.554
Q14	1.000	.507
Q16	1.000	.636
Q17	1.000	.581
Q18	1.000	.444
Q21	1.000	.524
Q15	1.000	.649
Q22	1.000	.675
Q24	1.000	.684

Extraction Method: Principal Component Analysis.

7.1.1.2 Total Variance Explained

The 28-items of the performance scale were assessed using a maximum likelihood analysis with Promax rotation. Table (34), below, suggests the presence of nine components with Eigenvalues greater than 1, explaining 21.53%, 6.86%, 6.36%, 6.02%, 4.91%, 4.45%, 4.24%, 4.05% and 3.84% of the variance, respectively. Cumulatively, these nine factors explain 62.26% of the variance in the performance construct.

Table 34 Results of the Exploratory Factor Analysis using Maximum Likelihood with promax

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.030	21.535	21.535	6.030	21.535	21.535	5.667
2	1.921	6.860	28.395	1.921	6.860	28.395	2.296
3	1.783	6.369	34.764	1.783	6.369	34.764	1.885
4	1.687	6.024	40.787	1.687	6.024	40.787	2.463
5	1.376	4.916	45.703	1.376	4.916	45.703	2.052
6	1.247	4.454	50.158	1.247	4.454	50.158	1.955
7	1.188	4.243	54.400	1.188	4.243	54.400	2.135
8	1.135	4.052	58.452	1.135	4.052	58.452	1.739
9	1.075	3.840	62.292	1.075	3.840	62.292	1.532
10	.977	3.489	65.781				
11	.912	3.258	69.039				
12	.860	3.072	72.111				
13	.850	3.035	75.146				
14	.770	2.750	77.896				
15	.734	2.621	80.517				
16	.687	2.455	82.972				
17	.621	2.218	85.190				
18	.609	2.175	87.366				
19	.503	1.797	89.162				
20	.484	1.730	90.892				
21	.439	1.568	92.459				

22	.388	1.386	93.846				
23	.375	1.338	95.184				
24	.355	1.267	96.450				
25	.296	1.059	97.509				
26	.272	.970	98.479				
27	.261	.932	99.411				
28	.165	.589	100.000				

7.1.1.3 Scree Test

Figure (16) graphically displays the Eigenvalues for each component, revealing a change at around the fifth component, with components 1, 2, 3, and 4 explaining the majority of the variance and suggesting the retention of the first four components for further investigation.

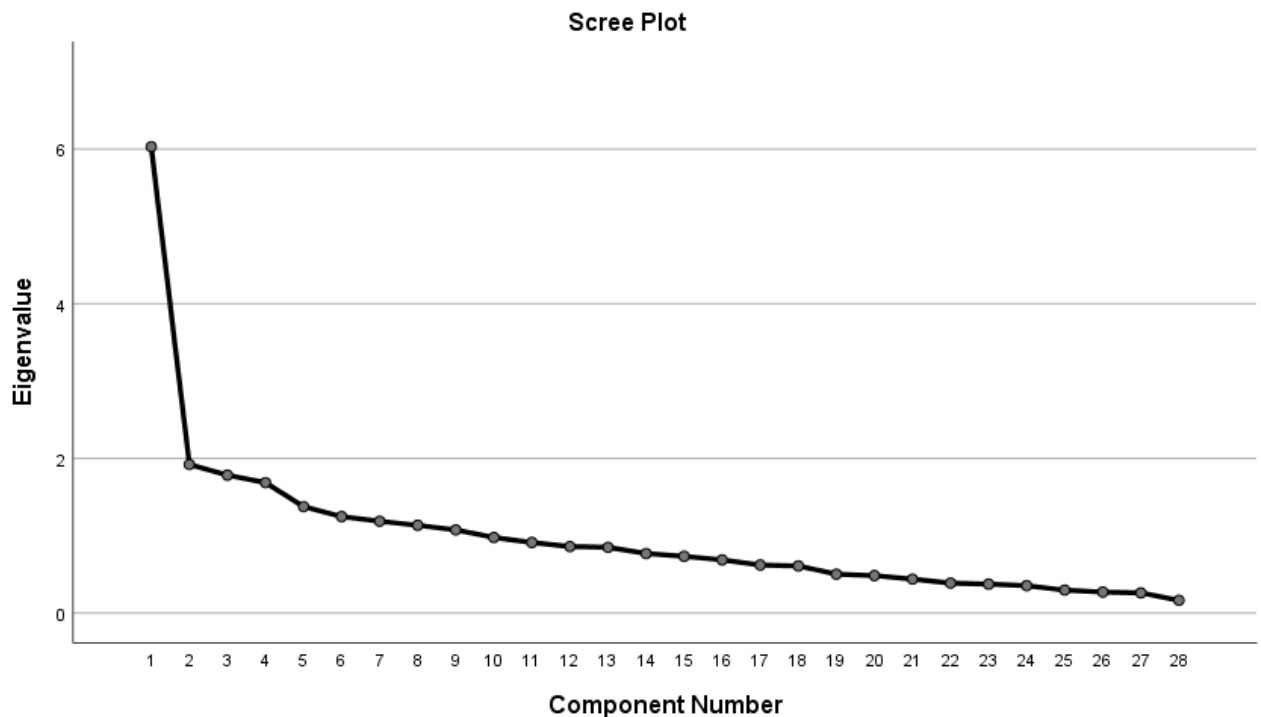


Figure 16 Results of Cattell's Scree Plot for the Performance Measures Scale

7.1.2 Parallel Analysis (PA)

Further reducing the number of components retained for further investigation was supported by the results of the Monte Carlo Parallel Analysis Table (35), which yielded four components with an Eigenvalue exceeding the criterion values for a randomly generated data matrix of the same size (i.e., 28 variables x 180 respondents, 1000 replications).

Table 35 Results of the Monte Carlo Parallel Analysis

Eigenvalue #	Random Eignvalue	Standard Dev
1	1.8168	.0717
2	1.6906	.0534
3	1.5974	.0435
4	1.5197	.0391
5	1.4468	.0365
6	1.3824	.0335
7	1.3225	.0320
8	1.2653	.0293
9	1.2108	.0276
10	1.1586	.0253
11	1.1094	.0251
12	1.0631	.0250
13	1.0169	.0244
14	0.9737	.0243

Considering the Eigenvalues, scree-plot, and Monte Carlo PCA for parallel analysis, combined with the literature on performance measures, it was decided to bring a four-factor model forward during further factor analysis. Where the initial Eigenvalue exceeded the Parallel Analysis Criterion value, the factor was retained. Where the Criterion value exceeded the initial Eigenvalue, the factor was rejected. The decision to retain four factors for EFA is depicted in Table (36).

Table 36 Decision table comparing the results of the initial exploratory factor analysis and parallel analysis for the performance measure scale

Component	Initial Eigen value from EFA	Criterion value from Parallel Analysis	Decision
1	6.030	1.8150	Retain
2	1.921	1.6903	Retain
3	1.783	1.5951	Retain
4	1.687	1.5159	Retain
5	1.376	1.4456	Reject

7.1.2.1 Pattern Matrix

A four-component solution explained a total of 40% of the variance. As the next step towards item reduction, cross-loading items on the 28-item pattern matrix were examined (see Table 37). For ease of interpretability, all factor loadings <0.30 are not shown in the table. Items with a loading >0.30 on more than one factor were considered cross-loading and considered for deletion, as recommended by

(Comrey & Lee 1992). The semi-final pattern matrix further suggested the retention of four factors, each representing a subscale of the performance scale.

Table 37 Results of the communalities matrix obtained from the principle component analysis of the initial performance scale

	Pattern Matrix								
	Component								
	1	2	3	4	5	6	7	8	9
Q15: How many PNC visits are there?	.833								
Q27: How well does a CMW demonstrate new-born resuscitation?	.802								
Q2: What do you do after ANC visit, after taking Hx and Ex?	.765								
Q25: How well does a CMW demonstrate hand washing?	.717								
Q29: How well does a CMW, know what's missing from her maternal kit?	.710								
Q26: How well does a CMW, wear and take off her gloves?	.709								
Q14: How do you measure the physical condition of a new-born?	.684								.356
Q1: How many ANC visits are there?	.634								
Q30: How well does a CMW, measure vital signs (BP, PR, Temp)?	.443				.304				-.334
Q11: How would you manage an eclampsia case in labour?	.434	.303						-.373	
Q5: What are the high-risk pregnancy cases that require institutional delivery?		.727							
Q18: Which cases require immediate referral during puerperium?		.576							
Q16: What do you do in PNC visit?		.545			.332			.329	
Q21: What are family planning methods?		.416					.393		

Q23: Do you keep a CMW report?			.893						
Q20: Do you conduct family planning visits?			.885						
Q8: How do you treat emergencies occurring during labour?				.784					
Q19: Have you referred a case before?			- .321	.626				- .325	
Q12: How do you manage an umbilical cord prolapse?		.352			.793				
Q13: How would you manage a breech delivery?					.595				
Q4: How do you conduct birth preparation plan counselling?						.855			
Q22: What other activities do you perform in the community?				.475	- .356	.561			
Q6: Did you refer ANC case before?							.788		
Q3: Do you conduct birth preparation plan counselling?							.661		
Q28: How well does a CMW, sterilise her equipment?								.830	
Q17: How do you counsel for PNC for the mother and baby?	.358							.380	
Q24: Which items are in the CMW report?									.798
Q7: Which cases require immediate referral after labour?				.430		- .344			- .537
Extraction Method: Principal Component Analysis.									
Rotation Method: Promax with Kaiser Normalization.									

The first nine items loaded onto the first factor (PERF1). This factor contained five out of the six observed competency items (i.e., the items that were answered by the assessor, based on the demonstrations detailed in Chapter 6 section 6.2), and four knowledge-based questions, assessed using test items. One of these items (How do you measure the physical condition of a newborn), initially designed as knowledge-based question, was phrased as whether or not a CMW

knew 'how to' complete a specific task. Therefore, this factor was named the 'know-how to do' factor, as it appears to mostly capture items that measure a mixture of knowledge and competency. These are represented in the tool by items Q1, Q2, Q 11, Q14, Q15, Q17, Q25, Q26, Q27, 29, and Q30.

Factor two (PERF2), on the other hand, included items that measure the CMW's knowledge of danger signs and what to do in the case of the presence of such danger signs, as what to do during an umbilical cord prolapse, as well as what to do during PNC visits and for family planning (i.e., items: What are the high-risk pregnancy cases that require institutional delivery? how would you manage an umbilical cord prolapse? What do you do in the PNC visit for mother and newborn? Which cases require immediate referral during puerperium? What are family planning methods?). Only one item (What are family planning methods?) seemed to capture more of a knowledge question. This factor was, therefore, termed the 'know-what-to do' factor. These are represented in the tool by items Q5, Q 12, Q16, Q18, and Q21.

The third factor, upon revision, was found to contain two items that were both leading in nature (i.e., items: Did you refer an ANC case before? Do you conduct birth preparation plan counselling?), and it was suspected that these two items were generating acquiescence among respondents. It was therefore decided to remove this factor.

The final, fourth factor is dominated by items that capture elements of compliance in addition to a knowledge item measuring what to do in the instance of emergency cases after labour (i.e., type of postpartum emergencies). This fourth and final factor was, therefore, termed the 'will to do' factor (PERF3). These are represented in the tool in items Q7, Q8, Q19, and Q22. Indeed, 'knowledge' was observed as cutting across all factors, in line with Gagné's (1993) concept of declarative and procedural knowledge. Where factor one 'Know-how' has five knowledge items (Q1,2,11,14 and 17). Factor two 'know-what' are all knowledge items and factor four, has one-knowledge item (Q7).

The EFA was then re-run, retaining only the items across these three factors. Cross-loading items on this revised 20-item pattern matrix were then examined. For ease of interpretability, all factor loadings <0.30 are not shown in the table (38). Items with a loading >0.30 on more than one factor were considered cross-loading

and deleted, as recommended by (Comrey & Lee 1992). The final pattern matrix continued to suggest the retention of three factors, each representing a subscale of the performance scale. The final list of 12 items, across the three factors, along with their standardised factor loadings, are presented in Table (38).

Table 38 Results of the communalities matrix obtained from the principle component analysis of the performance scale

Items	Factor		
	1	2	3
How many ANC visits are there?	.486		
What do you do during ANC visit, after taking history and examination?	.647		
How many post-natal care visits? And when?	.748		
How well does the CMW demonstrate wash their hands?	.937		
How well does the CMW demonstrate: How they wear gloves and take them off?	.916		
How well does the CMW Demonstrate New-born Resuscitation?	.621		
How well does the CMW demonstrate: Knows what's missing from her Maternal Kit?	.435		
How well does the CMW demonstrate: Measure vital signs (BP, PR, Temp)?	.827		
What are the high risk pregnancy cases that require institutional delivery?			.734
What do you do in the PNC visit for mother and newborn?		.800	
How do you counsel for PNC for the mother and baby?		.861	
What are family planning methods?			.700

7.1.2.2 Factor Correlation Matrix

Table (39) presents the factor relation matrix of the three components identified as part of the EFA. A positive correlation was found between the three different factors. A moderate correlation is between PERF 2 and PERF1 ($r = 0.420$). PERF1 and PERF3 were weakly correlated ($r = .228$) and the smallest correlation found between PERF3 and PERF2 ($r = 0.115$).

Table 39 Correlation Matrix for three factors of the performance measure scale

Component	1	2	3
1		0.420	
2			.115
3	0.228		

7.1.3 Confirmatory Factor Analysis for the Performance scale

Confirmatory Factor Analysis (CFA), as a useful tool for model comparison, was subsequently used to compare two plausible latent variable models of the performance scale, using a weighted least-square means and variance adjusted (WLSMV) estimator. Model 1 (M1) was a three-factor correlated solution consisting of the know-how (8-items), know-what (2-items), and will-to (2-items) factors.

Model 2 (M2) was a unidimensional model of performance, whereby all 12 items were restricted to load onto a single latent variable of performance. Table (40) reports the fit indices and comparative fit indices for both investigated models of the performance scale. Both models showed poor fit indices. However, M1, showed better fit-indices ($X^2= 153.221$ * $df =51$, p -value = 0.00, CFI= 0.711, TLI= 0.625, RMSEA= 1.06 (0.087 to 0.125), WRMR=1.008).

Table 40 Fit indices and comparative fit indices for both investigated models of the performance scale

	X2	df	CFI	TLI	RMSEA	WRMR
M1	153.221*	51	0.711	0.625	0.106 (0.087 - 0.125)	1.008
M2	117.311*	27	0.580	0.441	0.136 (0.112 - 0.162)	1.320

The model modification fit indices for knowledge question 2(what do you do during ANC visit and after taking Hx and Ex?) showed a negative correlation. Also, the compliance question 15 (How many PNC visits?) was removed and question 27 (How well does a CMW demonstrate new-born resuscitation?) Further examination of the modification indices suggested to the removal of questions 2, 15, and 27 to substantially improve model fit, on the basis of their suggested correlates onto both factors 2 and 3.

These additional item reduction steps improved model fit indices ($X^2= 33.530$ * $df =24$, p -value = 0.0934, CFI= 0.956, TLI= 0.934, RMSEA= 0.047 (0.000 to 0.082), WRMR=0.598). While the good model fit here is unsurprising given the data-driven item reduction techniques inherent to an EFA. Therefore, and for parsimony and ease of interpretability, the three-factor correlated solution was subsequently brought forward to the regression phase. The final factor structure of the

performance scale, including standardised factor loadings, is presented in Table (41).

The revised version of the performance scale consists of 9-items, all of which loaded positively and significantly ($p < 0.001$) onto the performance construct. The results of the CFA are summarised in Table (41).

Table 41 The standardised factor loadings of the performance

Item	Estimate	S.E.	Est./S.E.	P-Value
'know-how to do'				
Q25: How well does the CMW demonstrate wash their hands?	0.837	0.047	17.834	0.000
Q29: How well does the CMW demonstrate: Knows what's missing from her Maternal Kit?	0.603	0.061	9.954	0.000
Q26: How well does the CMW demonstrate: How they wear gloves and take them off?	0.865	0.038	22.744	0.000
Q30: How well does the CMW demonstrate: Measure vital signs (BP, PR, Temp)?	0.639	0.065	9.839	0.000
Q1: How many ANC visits are there?	0.634	0.081	7.802	0.000
'know-what to do'				
Q16: What do you do in the PNC visit for mother and newborn?	0.577	0.070	8.201	0.000
Q17: How do you counsel for PNC for the mother and baby?	0.854	0.081	10.480	0.000
'will to do'				
Q5: What are the high-risk pregnancy cases that require institutional delivery?	0.580	0.073	7.890	0.000
Q21: What are the family planning methods?	0.537	0.082	6.555	0.000

7.1.4 Reliability of the Performance scale

The internal reliability of the 9- items Performance scale was subsequently calculated using Cronbach's Alpha. Reliability coefficients are reported for each performance factor and the entire performance scale in Tables (42) and (43). The Cronbach's alpha value of 0.742 indicates an acceptable level of reliability for the Performance scale.

Table 42 Reliability coefficient for each performance factor

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q1 How many ANC visits are there?	14.5059	15.292	.468	.239	.721
Q6 How well does the CMW demonstrate wash their hands?	11.8297	10.958	.722	.642	.650

Q7 How well does the CMW demonstrate: How they wear gloves and take them off?	12.2104	10.888	.772	.678	.639
Q8 How well does the CMW demonstrate: Knows what's missing from her Maternal Kit?	11.3582	11.365	.522	.336	.705
Q9 How well does the CMW demonstrate: Measure vital signs (BP, PR, Temp)?	12.8695	10.333	.560	.385	.704
Q2 What are the high-risk pregnancy cases that require institutional delivery?	14.8458	16.938	.169	.154	.750
Q3 What do you do in the PNC visit for mother and newborn?	14.8489	16.889	.163	.207	.749
Q4 How do you counsel for PNC for the mother and baby?	14.8617	16.611	.316	.254	.743
Q5 What are the family planning methods?	14.4896	16.553	.402	.219	.742

Table 43 Reliability of Performance scale

Reliability of Performance Scale	N	Number of items	Cronbach's Alpha	Cronbach's Alpha based on standardised items
	176	9	.742	.773

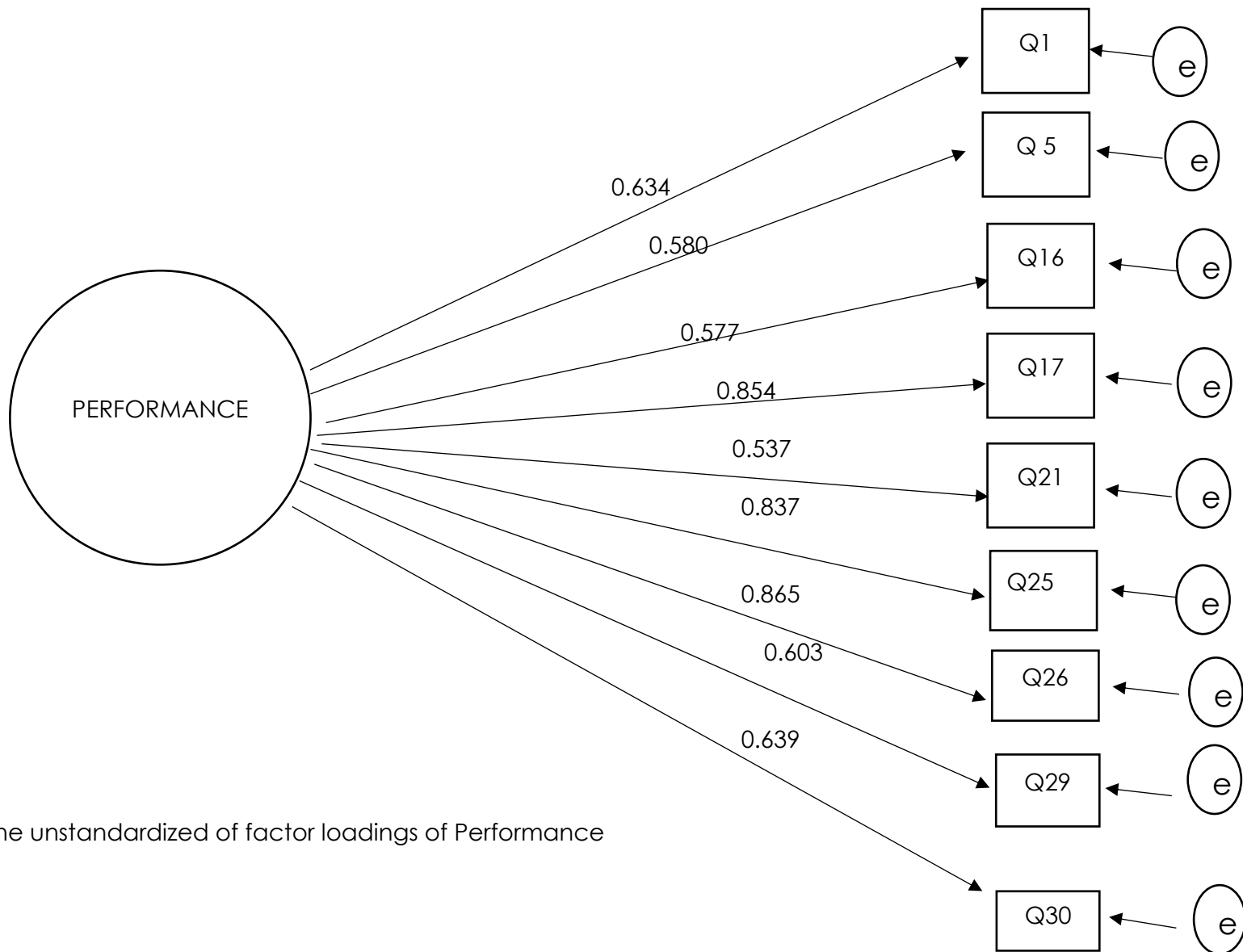


Figure 17 The unstandardized of factor loadings of Performance

7.2 Determinants of Performance measures

7.2.1 Job Satisfaction

7.2.1.1 Kaiser-Meyer Olkin Measure of sampling adequacy (KMO)

Given the limited knowledge of the factorability of the heavily adapted job satisfaction scale in the context of Sudan, the suitability of the job satisfaction data for factor analysis was assessed using principal component analysis (PCA) before carrying out an exploratory factor analysis (EFA). The 15-items of the JS scale were analysed using SPSS version 24. Table (44) presents the results of the KMO and Bartlett's Test. The KMO value of .859 exceeded the recommended value of 0.60 (Kaiser, 1974), and Bartlett's Test of Sphericity reached statistical significance ($\chi^2=1503.313$, $df=105$, $p=0.000$). Taken together, these results support the factorability of the correlation matrix. Inspecting the communalities matrix, depicted in Table (45), revealed all coefficients above 0.3.

Table 44 Results of the KMO and Bartlett's Test for the job satisfaction scale

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	1503.313
	df	105
	Sig.	.000

Table 45 Results of the communalities matrix obtained from the principle component analysis of the job satisfaction scale

Communalities		
	Initial	Extraction
JS1	1.000	.566
JS2	1.000	.760
JS3	1.000	.728
JS4	1.000	.613
JS5	1.000	.673
JS6	1.000	.353
JS7	1.000	.489
JS8	1.000	.684
JS9	1.000	.517
JS10	1.000	.735
JS11	1.000	.574
JS12	1.000	.476
JS13	1.000	.728
JS14	1.000	.844
JS15	1.000	.893
Extraction Method: Principal Component Analysis.		

7.2.1.2 Total Variance Explained

As part of EFA, the 15-items of the performance scale were subsequently reassessed using a maximum likelihood analysis with Promax rotation. Table (46) suggests the presence of three components, respectively. Cumulatively, these three factors explained 64.217% of the variance in job satisfaction.

Table 46 Results of the Job satisfaction Exploratory Factor Analysis using Maximum Likelihood with promax

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	6.028	40.185	40.185	6.028	40.185	40.185	4.956
2	2.229	14.857	55.041	2.229	14.857	55.041	4.817
3	1.376	9.175	64.216	1.376	9.175	64.216	3.485
4	.816	5.437	69.654				
5	.753	5.022	74.676				
6	.695	4.636	79.311				
7	.603	4.022	83.333				
8	.532	3.547	86.880				
9	.500	3.335	90.215				
10	.340	2.270	92.484				
11	.311	2.076	94.561				
12	.264	1.763	96.323				
13	.255	1.703	98.027				
14	.212	1.415	99.442				
15	.084	.558	100.000				
Extraction Method: Principal Component Analysis.							
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

7.2.1.3 Scree Test

The Scree plot presented in Figure (18) suggests a break after the fourth component, suggesting the retention of the first three components for further investigation, with components 1, 2, and 3 explaining most of the variance.

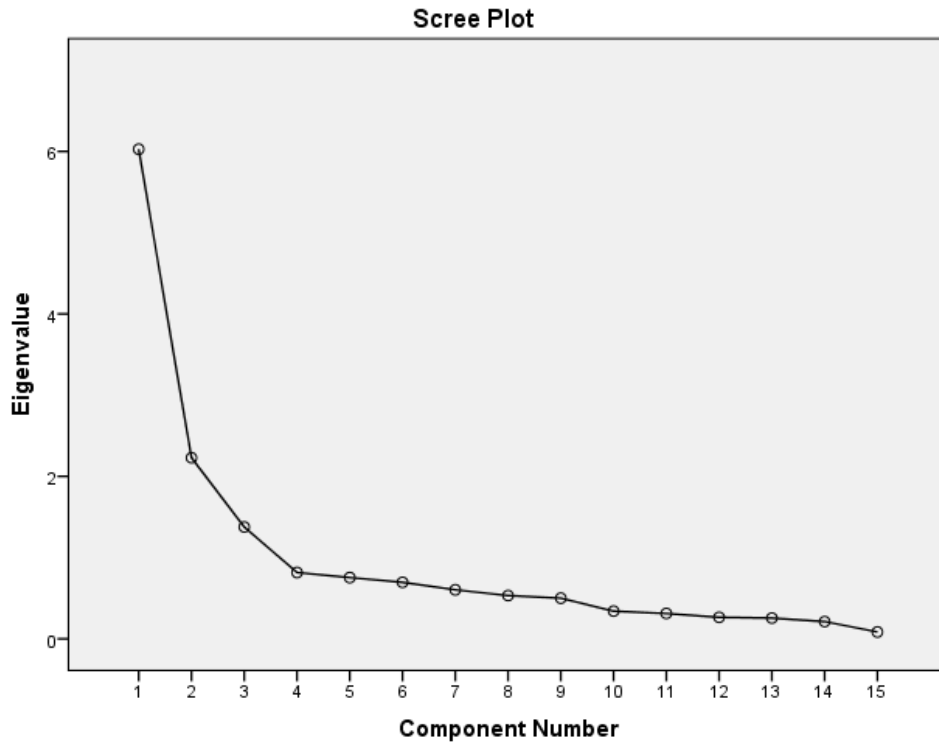


Figure 18 Results of Cattell's Scree Plot for the Job satisfaction scale

7.2.1.4 Parallel Analysis (PA)

The decision to reduce the number of components for further investigation was supported by the results of the Monte Carlo Parallel Analysis presented in Table(47). The results of the analysis yielded three components with an Eigenvalue exceeding the criterion values for a randomly generated data matrix of the same size (i.e., 15 variables x 180 respondents, 1000 replications).

Table 47 Results of the Monte Carlo Parallel Analysis

Eigenvalue #	Random Eigenvalue	Standard Dev
1	1.5255	.0670
2	1.4044	.0466
3	1.3124	.0399
4	1.2343	.0352
5	1.1626	.0325
6	1.0953	.0301
7	1.0339	.0294
8	0.9766	.0291
9	0.9191	.0275
10	0.8647	.0271
11	0.8097	.0281
12	0.7548	.0285
13	0.7003	.0297

Where the initial Eigenvalue exceeded the Parallel Analysis Criterion value, the factor was retained. Where the Criterion value exceeded the initial Eigenvalue, the factor was rejected. When the Eigenvalues, scree-plot, and Monte Carlo PCA for parallel analysis were considered together in combination with the literature on job satisfaction measures, it was decided to bring a three-factor model forward during further factor analysis. The decision to retain three factors is depicted in Table (48).

Table 48 Decision table comparing the results of the initial exploratory factor analysis and parallel analysis for the performance measure scale

Component	Initial Eigen value from EFA	Criterion value from Parallel Analysis	Decision
1	6.027	1.5255	Retain
2	2.220	1.4044	Retain
3	1.390	1.3124	Retain
4	.814	1.2343	Reject

7.2.1.5 Pattern Matrix

A three-component solution explained a total of 64.245% of the variance, with components 1, 2, and 3 contributing 6.027%, 2.220%, and 1.390%, respectively. As the next step to item reduction, cross-loading items on the 15-item pattern matrix were examined. Items with a loading $>.30$ on more than one factor were considered for deletion, as recommended by (Comrey & Lee, 1992). The only cross-loading item, 'How satisfied are you with training opportunities?' was therefore removed. Factor loadings for each of the 15-items are presented in Table (49). For ease of interpretability, all factor loadings <0.30 are not shown.

Table 49 Results of the communalities matrix obtained from the principle component analysis of the initial job satisfaction scale

Pattern Matrix^a			
	Component		
	1	2	3
Working for the government [JS1]	.839		
Incentives from the government [JS2]	.902		
Community Funds for Projects [JS3]	.913		
Support from Community Leaders [JS4]	.703		
Support from the Community [JS5]	.594		
Your inclusion in issues having to do with women in the community [JS6]		.394	
Training opportunities [JS7]	.350	.468	
Availability of equipment and supplies [JS8]		.827	

Availability of water and electricity needed for my work [JS9]		.821	
Availability of drugs for my patients [JS10]		.921	
The amount of challenge in my job [JS11]		.661	
The amount of job security I have [JS12]		.499	
Overall, I am very satisfied with my job [JS13]			.868
The opportunity to use my abilities in my job [JS14]			.925
That I accomplish something worthwhile in this job [JS15]			.967

The semi-final pattern matrix suggested a three-factor solution representing job satisfaction subscales. Five items loaded on the first factor, all of which were items associated with job satisfaction, including community support, employment, and financial compensation. These items are represented on the scale by items JS1-JS5. Another five items loaded onto factor 2, three of the items were associated with the availability of adequate resources in work, items JS8-JS10. Item 11 assessed job security, and item 12 assessed job security level. Three items loaded strongly onto the third and final factor, two of which were items associated with intrinsic job satisfaction, including ability utilisation and achievement, and one item measuring overall job satisfaction (JS13). As a next step to item reduction, any non-significant factor loadings (i.e. p -value > 0.05) were considered for deletion. This included item 6, 'Your inclusion in issues having to do with women in the community'. The job satisfaction scale was, therefore, reduced to 13 items.

Table 50 Results of the communalities matrix obtained from the principle component analysis of the job satisfaction scale

	Component		
	1	2	3
Working for the government [JS1]	.841		
Incentives from the government [JS2]	.901		
Community Funds for Projects [JS3]	.912		
Support from Community Leaders [JS4]	.708		
Support from the Community [JS5]	.598		
Availability of equipment and supplies [JS8]		.828	
Availability of water and electricity needed for my work [JS9]		.823	
Availability of drugs for my patients [JS10]		.917	
The amount of challenge in my job [JS11]		.643	
The amount of job security I have [JS12]		.498	
Overall, I am very satisfied with my job [JS13]			.865
The opportunity to use my abilities in my job [JS14]			.934
That I accomplish something worthwhile in this job [JS15]			.973

7.2.1.6 Factor Correlation Matrix

Table (51) presents the factor correlation matrix of the three components identified as part of the EFA. As none of the correlation coefficients exceeded $r = 0.70$, we can assume that the three factors are distinct, but positively correlated. The largest correlation was found between components 1 and 2 ($r = .568$). A moderate correlation was found between components 1 and 3 ($r = .352$) and components 2 and 3 (.313).

Table 51 Correlation Matrix for the factors of the job satisfaction scale

Component Correlation Matrix			
Component	1	2	3
1	1.000	.568	.352
2	.568	1.000	.313
3	.352	.313	1.000
Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.			

CFA was once again applied as a useful tool for model comparison, comparing two plausible latent variable models of the job satisfaction scale, using the Maximum Likelihood with robust standard errors (MLR) estimator (Thompson, 2004). Model 1 (M1) was a three-factor correlated solution consisting of JSF1 (5-items), JSF2 (5-items) and JSF3 (3-items). Model 2 (M2) was a unidimensional model of job satisfaction, whereby all 7 items were restricted to load onto a single variable of job satisfaction. Table (52) reports the fit indices and comparative fit indices for both investigated models of the job satisfaction measure.

M1 was compared to a second model (M2), a unidimensional model, whereby all items were loaded onto a single job satisfaction construct. Both models showed poor model fit indices in their original form. It was decided to proceed with M2 as a more parsimonious unidimensional model, as indicated by its lower AIC and BIC ($\chi^2 = 167.187^*$, $df = 65$, $CFI = 0.825$, $TLI = 0.790$, $RMSEA = 0.093$ (0.076- 0.111) and $SRMR = 0.073$).

Table 52 The fit indices and comparative fit indices for both investigated models of the job satisfaction measure

	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR	BIC	AIC
M1	175.268*	62		0.806	0.756	0.101 (0.083 - 0.118)	0.091	4848.052	4713.948
M2	167.187*	65		0.825	0.790	0.093 (0.076- 0.111)	0.073	4831.663	4707.138

Further consultation of the modification indices suggested a problematic item: JS 3, 4 and 5 had a (p-value >.05). Furthermore, JS 13,14, and 15 had negative fit indices/ correlation) and were therefore removed. This resulted in improvements in Goodness-of-fit indices ($\chi^2= 27.474^*$, $df =14$, $p<0.05$; RMSEA= 0.073 (CI 90%= [0.05 to 0.159]); SRMR= 0.046; CFI= 0.964; TLI=0.946). The final CMW job satisfaction scale therefore had 7-items. Table (53) summarises the standardised factor loadings for each of the job satisfaction items onto their respective factors.

Table 53 The standardised factor loadings of the job satisfaction

Item	Estimate	S.E.	Est./S.E.	P-Value
JS1: Working for the government	0.467	0.060	7.801	0.000
JS2: Incentives from the government	0.351	0.074	4.715	0.000
JS8: Availability of equipment and supplies	0.853	0.033	25.660	0.000
JS9: Availability of water and electricity needed for my work	0.903	0.023	38.676	0.000
JS10: Availability of drugs for my patients	0.699	0.045	15.647	0.000
JS11: The amount of challenge in my job	0.214	0.061	3.512	0.000
JS12 The amount of job security I have	0.558	0.065	8.602	0.000

7.2.2 Reliability of the Job satisfaction scale

The reliability of the 7- items job satisfaction scale was assessed using Cronbach's Alpha. A summary of the reliability is reported in the Table (54). The Cronbach's alpha value of 0.830 indicates an acceptable level of internal reliability for the job satisfaction scale.

Table 54 Reliability of the job satisfaction scale

Reliability of Job Satisfaction Scale	N	Number of items	Chronbach's Alpha	Chronbach's Alpha Based on Standardised items
	180	7	.830	.831

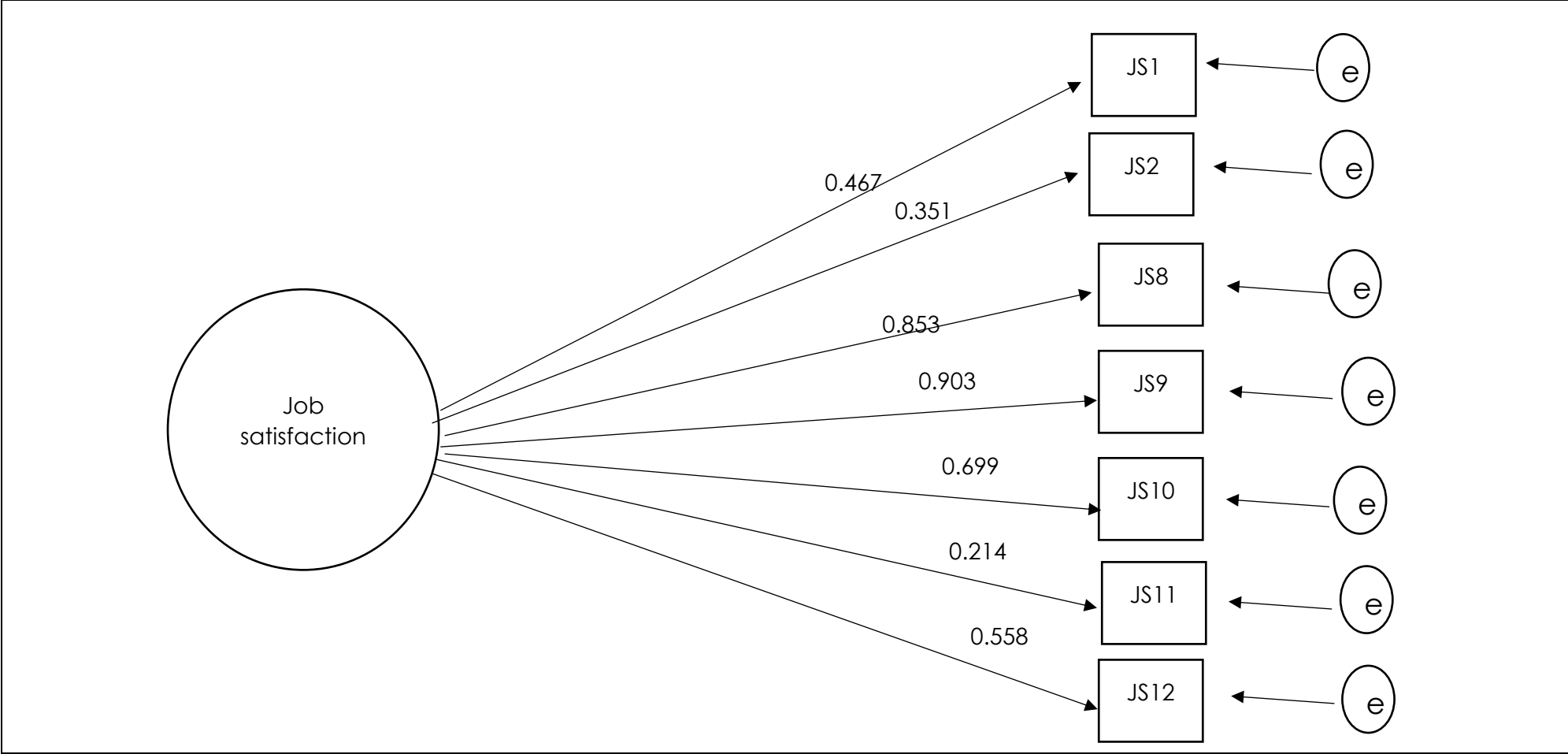


Figure 19 The unstandardized factor loadings of the Job satisfaction

7.2.3 Perceived Supervision

7.2.3.1 Confirmatory factor analysis (CFA)

Given that perceived supervision was assessed using a pre-existing scale (i.e., the PSS), the PSS was subjected to confirmatory factor analysis to assess the factorial validity of the scale in this context. While the PSS has six items, only five items were used in this context, given difficulties with the translation of one of the items, as described in greater detail in Chapter 6. The results of the CFA, conducted in Mplus Version 7 (Thompson, 2004) with a robust maximum likelihood (MLR) estimator, are summarised in Table (55). Goodness-of-fit indices suggested a good fitting model, with five out of five adequate fit statistics ($\chi^2= 3.14$, $df=5$, $p<0.05$; RMSEA=0.000 (CI 90%= [0.00-0.08]); SRMR=0.02; CFI=1.000; TLI=1.024). Factors loadings for each observed variable on their respective latent variable were all statistically significant ($p<0.05$) and positive, as summarised in Table (56).

Table 55 Fit indices of the perceived supervision scale

	X2	df	CFI	TLI	RMSEA	SRMR	BIC	AIC
5 items	3.146*	5	1.000	1.024	0.000 (0.000- 0.081)	0.019	2224.788	2176.894

Table 56 The standardised factor loadings of the perceived supervision

Item	Estimate	S.E.	Est./S.E.	P-Value
PS 1: My supervisor meets with me regularly	0.752	0.049	15.188	0.000
PS 2: My supervisor meets with me regularly to discuss problems and solutions	0.865	0.035	24.677	0.000
PS 3: My supervisor takes into consideration my views and ideas	0.819	0.045	18.046	0.000
PS 4: My supervisor appreciates me	0.832	0.048	17.304	0.000
PS 5: My supervisor helps me to update my knowledge	0.762	0.056	13.721	0.000

7.2.3.2 Reliability of the perceived supervision scale

The reliability of the 5-item supervision scale was calculated using Cronbach's alpha. A summary of the scale's internal reliability is reported in Table (57). The Cronbach's alpha value of 0.900 indicates an acceptable level of reliability for the supervision scale.

Table 57 Reliability of the perceived supervision scale

Reliability of Supervision Scale	N	Number of items	Mean	SD	Cronbach's Alpha
	180	8	16.97	4.573	.900

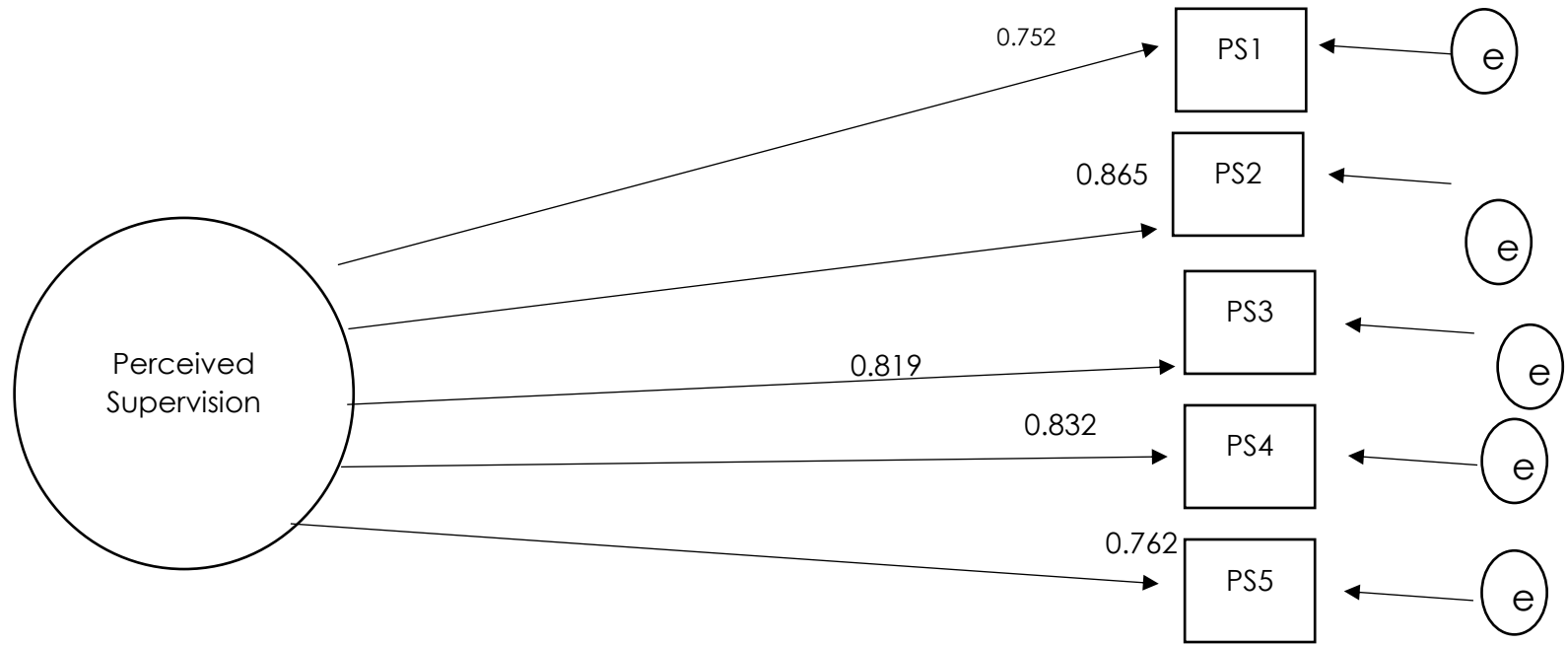


Figure 20 The unstandardised factor loadings of the perceived supervision

7.2.4 Motivation

7.2.4.1 Confirmatory factor analysis (CFA)

The motivation scale consisted of 11 items. As with the PSS, and given the use of a pre-existing scale in the measure of motivation, CFA was used to validate the factor structure of the Motivation to Help Scale for use among CMWs in the Sudanese context (Weinstein & Ryan, 2010). The CFA results, conducted using a robust maximum likelihood (MLR) estimator, are summarised in Table (58), below. Based on the hypothetical models from the literature, different models for the motivation scale were tested. The first model (M1) was the original factor structure proposed by the scale authors, a correlated two-factor model measuring autonomous motivation (AM) using six items and controlled motivation (CM), assessed using five items.

M1 was compared to a second model (M2), a unidimensional model, whereby all items loaded onto a single motivation construct. Both models showed poor model fit indices in their original form. It was decided to proceed with M2 as a more parsimonious unidimensional model, as indicated by a lower AIC and BIC. As the next step to item reduction (Comrey & Lee, 1992), any non-significant items ($p > 0.05$) or items with factor loadings $B < 0.4$ were excluded.

Table 58 Fit indices and comparative fit indices for both investigated models of the motivation scale

	X2	df	X2/df	CFI	TLI	RMSEA	SRMR	BIC	AIC
M 1	250.151*	43		0.753	0.683	0.164 (0.144- 0.184)	0.123	5228.210	5119.649
M 2	250.091*	44		0.754	0.692	0.161 (0.142- 0.181)	0.122	5223.036	5117.668

Further consultation of the modification indices suggested a problematic item: CM3 (i.e., So that I would be liked), CM4 (i.e., Because others would get mad at me if I didn't) and AM5 (i.e. Because I think it is important to act this way). Removal of these items resulted in significant improvements to model fit ($\chi^2 = 31.979$ $df = 20$, $p < 0.05$; $RMSEA = 0.058$ (CI 90% = 0.010-0.094); $SRMR = 0.030$; $CFI = 0.976$; $TLI = 0.966$).

Table 59 Model fit indices for the motivation scale

	X2	df	X2/df	CFI	TLI	RMSEA	SRMR	BIC	AIC
M2 Less CM3	122.500*	35		0.873	0.837	0.118 (0.096- 0.141)	0.082	4592.004	4496.216
M2 Less CM3, AM5	91.036*	27		0.893	0.858	0.115 (0.089- 0.141)	0.073	4026.812	3940.602
M2 Less CM3, AM5, CM4	31.979*	20		0.976	0.966	0.058 (0.010- 0.094)	0.030	3416.596	3339.965

The removal of items CM3, AM5, and CM4 resulted in five out of five adequate fit statistics ($\chi^2= 31.979$ $df=20$, $p<0.05$; $RMSEA=0.058$ (CI 90%=0.010-0.094); $SRMR=0.030$; $CFI=0.976$; $TLI=0.966$). Factors loadings for each observed variable on their respective latent variable were all statistically significant ($p<0.05$) and positive, as summarised in Table (60). The result was an 8-item unidimensional model of motivation.

Table 60 The standardised factor loadings of the motivation

Item	Estimate	S.E.	Est./S.E.	P-Value
AM 1: Because I like acting this way	0.934	0.016	59.550	0.000
CM 1: Because I feel I should	0.793	0.058	13.694	0.000
AM 2: Because I enjoy it	0.640	0.053	12.052	0.000
AM 3: Because I care about the women in my community	0.951	0.013	71.927	0.000
CM 2: Because I feel I have to	0.666	0.053	12.463	0.000
AM4: Because I value doing so	0.827	0.039	21.277	0.000
CM 5: Because I would feel like a bad person if I didn't	0.448	0.054	8.368	0.000
AM 6: Because I appreciate that my help could be useful	0.909	0.034	26.570	0.000

7.2.4.2 Reliability of the Motivation scale

A summary of the reliability of the 8-item Motivation Scale is reported in Table (61) The Cronbach's alpha value of 0.905 indicates an acceptable level of reliability for the motivation scale.

Table 61 Reliability coefficient for the motivation factor

Reliability of Motivation Scale	N	Number of items	Mean	SD	Cronbach's Alpha
	180	8	27.19	7.200	.905

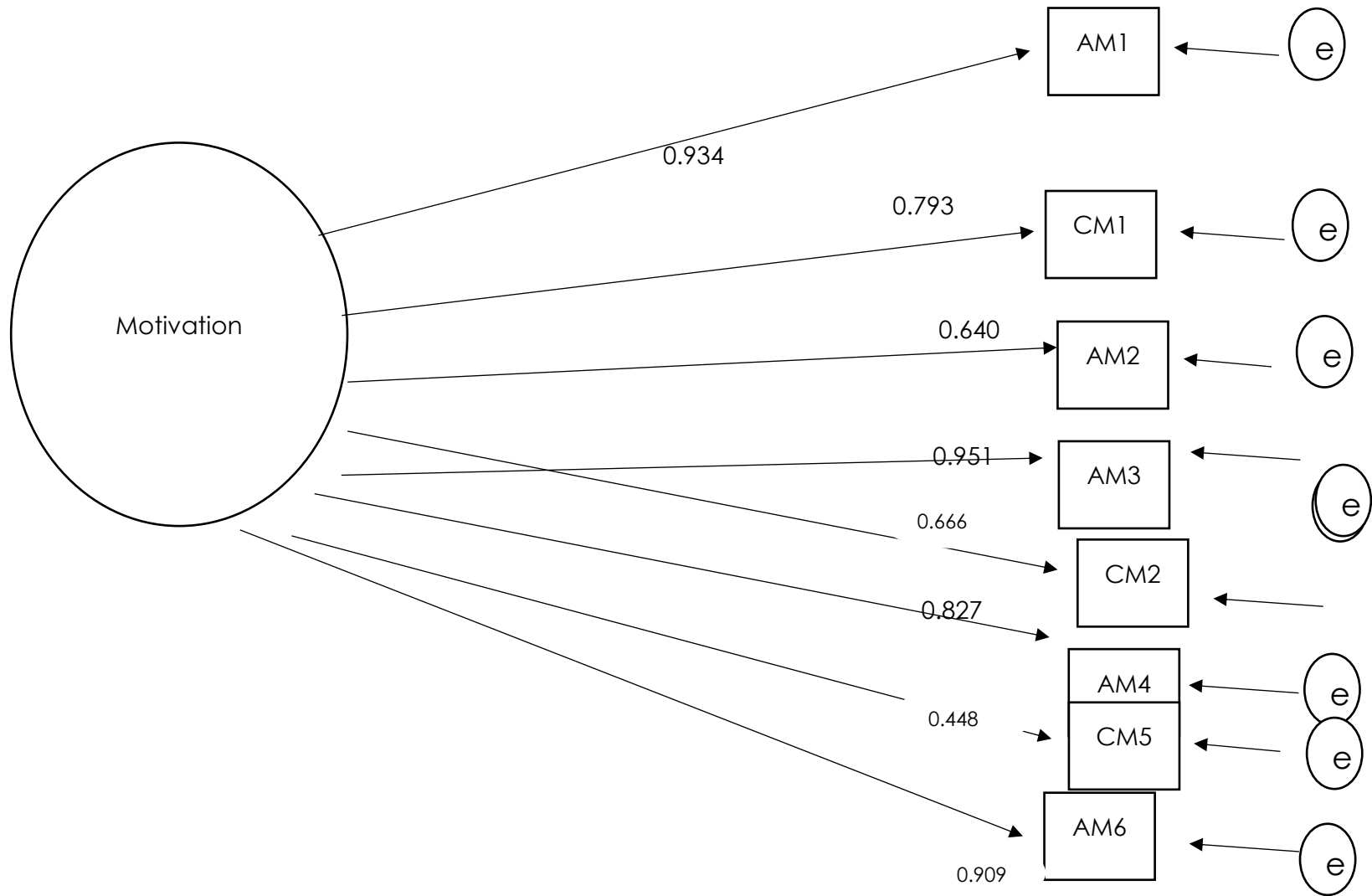


Figure 21 The unstandardised factor loadings of the perceived motivation

7.3 Descriptive Statistics

7.3.1 Performance

For each of the scales, all items were coded, scored, and computed to be given similar weight. For the performance scale, the competency questions assessed by a third-party were scored as follows: Scores of less than 3 were considered unacceptable and therefore scored as 0. Scores of greater than three considered desirable or 'correct' and were therefore scored a one. The knowledge question of 'How many ANC visits' was scored as either correct =1 or incorrect=0. Furthermore, the other four knowledge questions 5, 16, 17, and 21 were scored as a proportion of correctly given answers, with scores again ranging from 0-1 based on the proportion of correct answers identified by the respondent on that item (see chapter 6).

As detailed in Table (62) below, respondents, on average, were most knowledgeable on what's missing from her maternal kit (mean= 0.86), and family planning methods (mean= 0.73), and ANC visits required (mean=0.72), and less knowledgeable on the types of high-risk pregnancy that requires institutional delivery (mean= 0.37), PNC visit (mean= 0.37) and counselling (mean=0.36) procedures. In terms of the observational tasks, participants scored highest on hand washing, followed by wear and removal of gloves. Knowledge of how to measure the vital signs was the weakest in this sample.

Table 62 The Summary statistics of the responses to the performance scale

Questions	N	Mean	Std. Deviation
Will-to			
Q5 What are the high-risk pregnancy cases that require institutional delivery?	180	.37	.13427
Q21 What are the family planning methods?	177	.73	.17080
Know-What			
Q16 What do you do in the PNC visit for mother and newborn?	180	.37	.16690
Q17 How do you counsel for PNC for the mother and baby?	180	.36	.192332
Know-how			
Q1 How many ANC visits are there?	180	.72	.452
Q25 How well does the CMW demonstrate wash their hands?	180	.82	.388
Q26 How well does the CMW demonstrate: How they wear gloves and take them off?	180	.69	.464

Q29 How well does the CMW demonstrate: Knows what's missing from her Maternal Kit?	180	.86	.347
Q30 How well does the CMW demonstrate: Measure vital signs (BP, PR, Temp)?	180	.41	.493

7.3.2 Job satisfaction

Based on the table below, although respondents are somewhat satisfied with working for the government (mean= 3.01), they showed a lower satisfaction level of the working conditions in terms of the availability of equipment and supplies (mean=2.03), availability of drugs for patients (mean=2.02), availability of water and electricity (mean= 2.38), and incentives from the government (mean n=2.34).

Table 63 The Summary statistics of the responses to the Job satisfaction scale

	N	Mean	Std. Deviation
JS1 Working for the government	180	3.01	1.279
JS2 Incentives from the government	180	2.34	1.287
JS8 Availability of equipment and supplies	180	2.03	1.232
JS9 Availability of water and electricity needed for my work	180	2.38	1.317
JS10 Availability of drugs for my patients	180	2.02	1.221
JS11 The amount of challenge in my job	180	2.53	1.335
JS12 The amount of job security I have	180	2.73	1.290

7.3.3 Perceived Supervision

When asked how they perceive their supervisors, and whether they are satisfied with them, respondents showed a moderate level of satisfaction in terms of their meetings with supervisors (mean = 3.34), and discussion of problems and solutions (mean=3.46), and the way their supervisors consider their views and ideas (mean=3.29), and help them to update their knowledge (mean=3.2). Overall it seems respondents feel they are appreciated by their supervisors (mean= 3.6).

Table 64 The Summary statistics of the perceived supervision

	N	Mean	Std. Deviation
PS1 My supervisor meets with me regularly	180	3.34	1.173
PS2 My supervisor meets with me regularly to discuss problems and solutions	180	3.46	1.010
PS3 My supervisor takes into consideration my views and ideas	180	3.29	1.121
PS4 My supervisor appreciates me	180	3.59	.973
PS5 My supervisor helps me to update my knowledge	180	3.29	1.122

7.3.4 Motivation

As the previous performance determinant construct, motivation was somewhat a new concept to the context. As for sources and levels of motivation, respondents identified 'liking acting this way' as their highest source of motivation, followed by caring about women in their community, and the fact that their help can be useful.

Table 65 The Summary statistics of the responses to the motivation assessment questions

	N	Mean	Std. Deviation
AM1 Because I like acting this way	180	3.85	.989
CM1 Because I feel I should	180	3.66	.964
AM2 Because I enjoy it	178	3.19	1.356
AM3 Because I care about the women in my community	180	3.82	.987
CM2 Because I feel I have to	180	3.32	1.401
AM4 Because I value doing so	180	3.68	1.050
CM5 Because I would feel like a bad person if I didn't	180	1.78	1.393
AM6 Because I appreciate that my help could be useful	180	3.81	1.025
Valid N (listwise)	178		

7.4 Regression

Multiple linear regression was used to assess the correlation between the four identified scales: performance, job satisfaction, and perceived supervision and motivation. As per the performance theoretical framework depicted in section 7.6, performance was entered as the dependent variable, and job satisfaction, perceived supervision, and motivation were entered as independent variables.

7.4.1 Correlations between Scales

Table (66) summarises the correlation matrix of the variables. While all three determinants of performance variables were found to be significantly and positively correlated with one another, performance was significantly, but inversely related to job satisfaction, perceived supervision, and motivation. This suggests that CMWs with an increased level of job satisfaction, perceived supervision, or motivation tend to have decreased performance levels.

Table 66 Bi-variate Correlations Matrix

	Jop Satisfaction	Perceived Supervison	Motivation	Performance
Job Satisfaction	1	-	-	-
Perceived Supervison	.409**	1	-	-
Motivation	.306**	.570**	1	-
Performance	-.329**	-.344**	-.604**	1

** Correlation is significant at 0.01 level

The results of the multivariate linear regression is summarised in Table 67.

Table 67 The regression result

Regression Result					
Variable	Unstandardized Coefficients		Standardized Coefficients	t-statistic	Sig.
	B	Std. Error	Beta		
Constant	9.287	.454		20.447	.000
Job Satisfaction	-.058	.018	-.217	-3262	.001
Perceived Supervision	.026	.028	.069	.899	.370
Motivation	-.126	.017	-.539	-7.3	.000
R- Squared	0.36				
Std. Error of the Estimate	1.36209				

Overall, the model suggests that 36% of the variation in the performances is explained by the three explanatory variables included in the model ($R^2=0.36$). In this multivariate model, no relationship was found between perceived supervision and performance. Both job satisfaction and motivation, on the other hand, remained significantly negatively associated with performance, suggesting that higher levels of job satisfaction or motivation are associated with lower levels of performance, and vice versa. While the strength of the relationship between job satisfaction and performance is quite weak ($B = -0.217$), the relationship between performance and motivation would be considered moderate ($B = -0.539$).

7.5 Discussion

Chapter 6 resulted in the initial version of the CMW performance scale, which included items intended to measure knowledge, competency, and compliance, as measures of performance, job satisfaction, perceived supervision, and motivation, as predictors, or determinants, of performance. The final model was a unidimensional, nine-item solution. The model fit indices showed

acceptable fit indices ($\chi^2 = 33.530^*$ df = 24, p-value = 0.0934, CFI = 0.956, TLI = 0.934, RMSEA = 0.047 (0.000 to 0.082), WRMR = 0.598). The scale consists of the know-how-to-do (5-items capturing those items that measure skills and knowledge), know-what-to-do (2-items that measure the CMW's knowing what to do during PNC visits and how to counsel) and will-to-do (2-items characterised by items that capture elements of knowledge measuring what to do in the instance of high-risk pregnancies and family planning) factors. The Cronbach's alpha value of 0.742 indicates an acceptable level of reliability for the Performance scale.

Low levels of performance on a number of items could possibly be explained by a lack of resources. For example, while CMWs are trained to wear regular and surgical gloves, they often do not have them in stock, and as they are not provided to the CMW, and many of them therefore must purchase them. As for the midwifery kit, this is only renewed once a year by the Ministry of Health, with consumables renewed 1-3 times per year. Half of the CMWs unable to measure the vital signs correctly, having negative implications on the community's health. Likewise, that knowledge of how to measure the vital signs was the weakest in this sample is possibly related to the fact that the CMWs do not have a thermometer, sphygmomanometer, nor a watch in many situations; and are therefore limited in their ability to practice this skill after graduating from the training programme. The lack of resources available for CMWs to do their work is further evidenced in the job satisfaction scale, whereby CMWs expressed dissatisfaction with the lack of available drugs and equipment.

Overall performance scores however, were quite poor, which could have important implications for maternal and foetal morbidity and mortality in the context of Sudan. Therefore, more regular refresher training for CMWs is recommended (Glenton et al., 2013; Kok & Muula, 2013) in addition to the need to improve the work environment and conditions of the CMW, to better enable her to execute her duties (Tulenko et al., 2013; Oliver et al., 2015).

The second section presented the results of the factor analyses performed on the scales measuring determinants of performance: Job Satisfaction, Motivation, and Perceived Supervision. Whereas the results of the newly developed job satisfaction measure- Model 2 (M2), as a unidimensional model of job satisfaction, consisting of 7-items. Goodness-of-fit indices showed good fit

statistics ($\chi^2= 27.474^*$, $df=14$, $p<0.05$; RMSEA= 0.073 (CI 90%= [0.05 to 0.159]); SRMR= 0.046; CFI= 0.964; TLI=0.946). The Cronbach's alpha value of 0.83 indicates an acceptable level of internal reliability for the job satisfaction scale.

The confirmatory factor analyses for the previously validated measures of Perceived Supervision, showed a good fitting model, with five out of five adequate fit statistics ($\chi^2= 3.14$, $df=5$, $p<0.05$; RMSEA=0.000 (CI 90%= [0.00-0.08]); SRMR=0.02; CFI=1.000; TLI=1.024). The Cronbach's alpha value of 0.900 indicates an acceptable level of reliability for the supervision scale. Culturally, respect for seniors and supervisors is fundamental and some social-desirability bias was expected to be reflected in these results. Areas of improvement for supervision may include more regular supervision meetings and an emphasis on supportive methods of supervision (Hill et al., 2014). Supportive means may include record review, provider participation, problem solving, constructive feedback, and focused education (Bosch-Capblanch & Garner, 2008). This is considered particularly important given that many of the key informants expressed that CMWs were never exposed to regular supportive supervision, nor were they given constructive feedback.

The Motivation scale confirmatory factor analyses favoured an 8-item unidimensional model of motivation ($\chi^2= 31.979$ $df=20$, $p<0.05$; RMSEA=0.058 (CI 90%=0.010-0.094); SRMR=0.030; CFI=0.976; TLI=0.966). The Cronbach's alpha value of 0.905 indicates an acceptable level of reliability for the motivation scale.

Finally, the relationships between these various performance related-constructs were explored, as per the hypothesised theoretical framework presented at the end of Chapter 6. Contrary to the hypothesised framework however, results suggest no relationship between supervision and performance, and an inverse relationship between motivation and job satisfaction and performance in this sample. This finding is inconsistent with findings from other studies of performance, which tends to report a positive relationship between these factors and suggests that in this sample, motivation and job satisfaction are associated with lower performance measures. Likewise, higher scores on performance were associated with lower motivation and job satisfaction scores. The unexpected negative correlation between performance and the tested factors maybe attributed to many conceptual, cultural, system-related reasons. In

addition to lack of studies that explore factors as motivation from the health cadre and community they serve perspective (Maes K, 2015; Maes et al, 2014; Gilson et al, 2011) .To-date the study was identified among the first studies to address the topic of performance among the CMWs in Sudan. In addition, the global isolation the Sudan witnessed kept it unexposed to major research in the areas of industrial/organisational psychology. The dearth of similar research within the study area and study population allowed for the performance theoretical assumption to be based on theories from the global north. The study attempted to generate a context-specific framework that grasps the concepts, understanding and practice of identified stakeholders, participants, beneficiaries and CMWs of performance in low-resource setting of Sudan. The complexities of the country's health system, the adaptive mechanisms health workers operate in and the reality the new CMWs faces were alien to the international literature, creating the need for similar research to better understand and strengthen context-specific theories. Therefore, it was not empirically possible to test the current explanation offered.

One possible explanation for this observation is the level of work experience of the CMW. For example, those with less experience may start out with higher levels of motivation and job satisfaction, but their lack of opportunity to have put into practice their newly acquired skills may result in lower performance measures. Conversely, those with more experience may show better performance outcomes, but demonstrate lower levels of motivation and job satisfaction as a result of the lack of resources, including low or no remuneration, lack of career development opportunities, and a poor work environment reported in other low- or middle-income contexts (Willis-Shattuck et al., 2008; Rouleau et al., 2012; Agyepong et al., 2004). Moreover, Squires et al. (2015) argue, that while feeling dissatisfied may not lead to individuals quitting their jobs, dissatisfaction may impact on performance as well as the performance of colleagues, via displays of hostility in the workplace.

Despite efforts to reach the targeted geographical coverage of basic and comprehensive primary/family health care centres, this approach is not functioning as expected. The unavailability and scarcity of basic life-saving drugs, consumables, and equipment all have negative implications for the health worker's performance. Therefore, the CMW Performance Tool is in many ways

inextricable from the environmental and organisational factors that also impact on individual performance, i.e., that performance depends on more than individual factors and when measured should consider a broader system of factors that are mostly outside of the CMW's control, but which also impact on her performance.

Weak health worker deployment policies have left the health system with a shortage of health workers, despite an increase in HRH production rates (AbuAgl, 2013). This is still the case despite the expansion programme, whereby the Federal Ministry of Health officials stated that only <30% of the produced UHC cadres had been deployed. Frontline health workers are not properly deployed within their respective stations and the majority of CMWs (approximately >60%) still do not receive regular salaries. Incentives were given as compensation, but these represent such a small amount that, in many instances, the CMW would not collect it from the locality for a couple of months as it did not even cover her commuting cost.

Additionally, the lack of supply for essential drugs and equipment meant that the CMW would purchase the necessary consumables and equipment at her own expense. The result is that this cost would have to be passed onto those families that can afford to pay for her services. Likewise, less privileged families may avoid a costly delivery, opting instead for the help of the less trained traditional birth attendant (TBA). These factors, including feelings of not being appreciated or not appreciated by the health system, may further act to negatively affect the CMW's motivation and performance.

The presence of a private health sector offers opportunities for part-time jobs with better salaries and makes it difficult to retain a well-motivated, good-performing skilled health worker within the public sector. Where CMWs seek employment in hospitals, as opposed to the community, this can harm their geographical coverage and places her in a health institution that she is neither trained nor skilled enough to operate in, i.e., their availability, accessibility, acceptability and quality of health care services. Finally, high turnover at leadership and middle-management levels, as well as inadequate financing and governance, creates a disabling environment for CMWs.

7.6 Overall Discussion

The literature suggests the absence of a universal agreement on what constitutes performance, nor is their agreement on what defines a well-performing health worker. Together, the results of this study further support our understanding of performance as a complex, multi-factorial or multidimensional, and influenced by several individuals and broader, system-level determinants. Moreover, there appears to be a general agreement that performance measures should consider how performance is defined within a specific role and that chosen performance indicators should be indicative of the tasks and responsibilities assigned to this role. Within the context of Sudan, various definitions were given by key informants who understood CMW performance as “doing her pre-assigned job and doing it right,” which resonates with “Campbell (1993) definition of performance, who describes the individual performance as “what the organisation hires one to do and do well” (p.40).” The availability, accessibility, and acceptability of CMWs were considered essential pre-requisites for the measure of performance of CMWs in this study, in contrast to Campbell et al (2013), who consider these factors to comprise performance.

When explaining performance, however, and consistent with the results of this study, many scholars tend to combine individual differences and situational perspectives. The job characteristic model, for example, incorporates both individual differences and situational perspectives. Similarly, Waldman's (1994) proposed Model of Performance states that job performance is affected by both personal factors (i.e., individual differences) and systems factor (i.e., situational variables). He further specifies that systems factors moderate the effects of person factors on performance (Waldman, 1994). This resonates with the findings of the formative qualitative exploratory phase in Sudan, where determinants of performance identified through the participatory interviews, focus group discussions, and workshops, were categorised as being either contextual, from both the supply or demand side of the health system or individual/motivational factors. The demand-side also included socio-cultural health beliefs, norms, and taboos and financial hardship and choice for healthcare as being more specific to Sudan. Likewise, the dietary norms and socio-cultural health beliefs reflect the unique ethnic diversity and taboos embedded within Sudanese society,

negatively influencing health lifestyle choices. Access to clean water and financial hardship identified as determinant further impact the choice of health care within Sudan, where health is a privilege. Supply-side factors included the quality of CMW training, remuneration, supervision, and work environment. The third determinant is the individual/motivation factors, which include factors that relate to the CMW's satisfaction and motivation for working as a CMW. This is aligned to the individual differences considering issues of abilities, personality and or motivation, and situational/contextual perspectives focusing on work-place factors that either support or hinder performance (Sonnentag & Frese, 2002).

Furthermore, and while the systematic literature review identified a list of 16 constructs used to measure performance of maternal health care providers in LMICs, across determinants, measures, or outcomes of performance, the current study identified five constructs relevant to the measure of performance in Sudan. Two of these as measures of performance, including knowledge, and competency, both of which require skills and compliance to conduct quality service delivery. The knowledge and competency, as reflected in the know-how and know-what to do components of this scale are consistent with the concepts of task performance and contextual performance, respectively, as reflected in prominent theories and the broader performance literature.

Firstly, task performance, or job knowledge is identified across various frameworks including Campbell's (1990) job-specific and non-job-specific task proficiency factors, Murphy's (1989) task behaviour factor, and Viswesvaran's (1993) productivity, quality of work, and job knowledge factors. Also, the CMWs ability to deliver a newborn, further resonates with Motowildo and colleagues (1997) understanding of task performance activities as those that transform raw materials into goods and services for the organisation. Mael et al. (2010) further consider providing clinical services and clinical support as other task performance variants, similar to CMWs delivering the integrated PHC package to the communities in which she works.

As for the contextual performance dimension, many scholars identify this as the second main category of performance, as reflected in Campbell and Viswesvaran's performance models (Campbell, 1990; Viswesvaran, 1993). Furthermore, Viswesvaran (1993) includes interpersonal competencies and

compliance. This resonates with the current study's constructs, whereby competency was identified by key stakeholders and used interchangeably with skills. However, within the Sudanese context, competency was more so described in terms of procedural knowledge and skills, compared to solely skills.

In conclusion, the proposed CMW performance theory for Sudan (see Figure 22) combines the results of the three phases of the study, and adopts a system thinking approach to highlight the importance of pre-requisites being the availability, accessibility, and acceptability of CMWs. Next, the country's geosocio-political, supply and demand factors, are considered. The individual performance of the CMW is measured by the 'know-how,' and 'know-what,' (i.e., the constructs of knowledge and competency) and determined predominantly by job satisfaction and motivation (for final reference to the scale see annex 10). It is recommended that the performance of the CMW is measured by the head of health unit, as the health visitor from a different village or district/locality in order to minimise bias. In addition, the above mentioned contextual factors are considered a foundational step in the measure of CMW performance. The tool follows a continuum of care approach, with knowledge items proceeding competency items, in order to build rapport for the following job satisfaction and motivation sub-scales. While the job satisfaction and motivation are set up as Likert scales, the 'know-how', competency items are scored $<3=0$ and $\geq 3=1$. While the remaining questions, have a number of items to calculate as a percentage of correctly identified items, for a total possible score of 1 (i.e. 100%) for each item. It takes an average of 20-30 minutes to administer the tool. A quiet room/office, with the pre-setting of the competency stations is required.

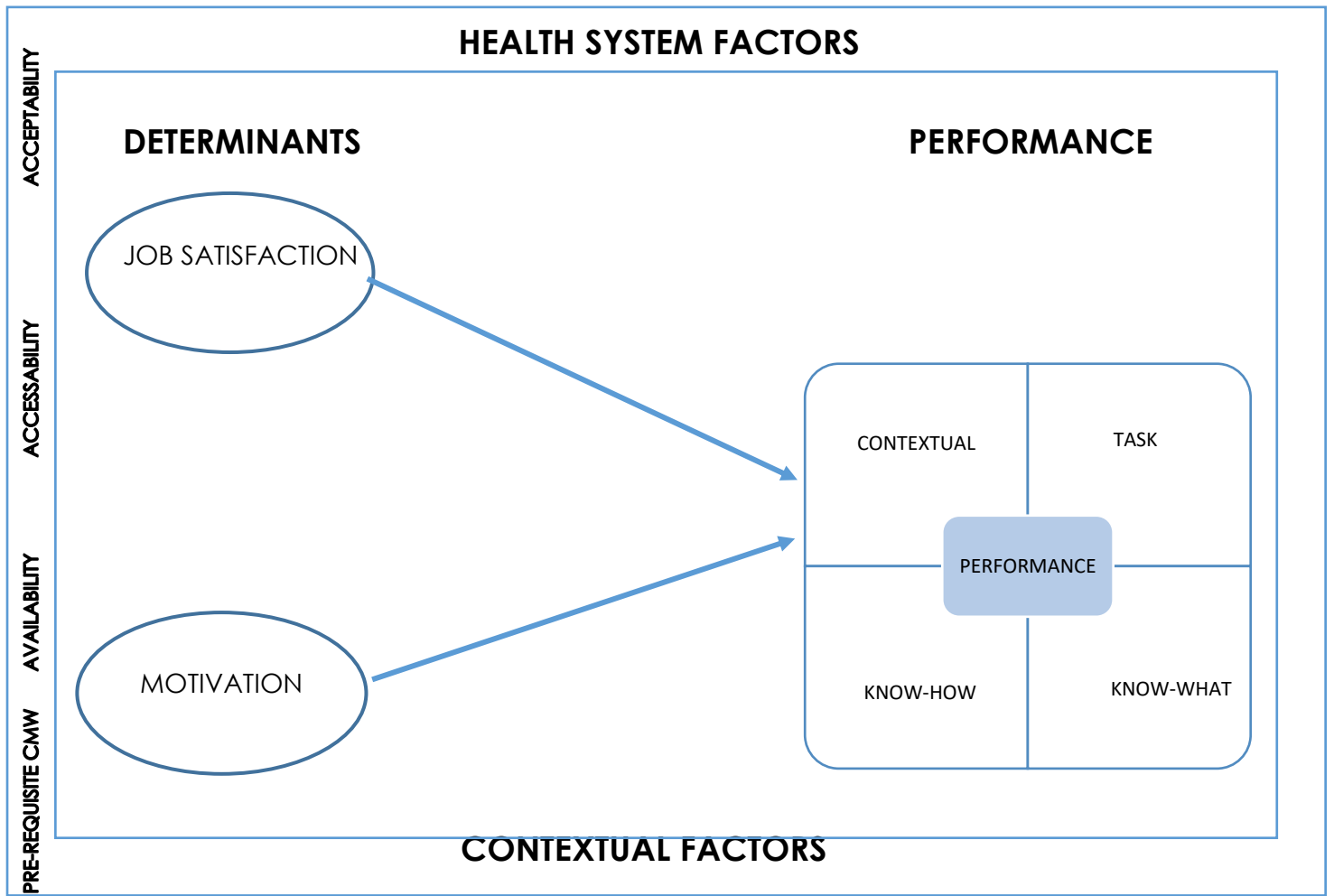


Figure 22 Final Performance Model

8 Chapter Eight Conclusions & Limitations

Introduction

This chapter discusses the overall findings in light of the existing body of literature and their implications for theory, policy, and practice. A revised theoretical framework describing the determinants and components of performance of community midwives in Sudan is discussed. The implications of the findings for future research and limitations of the current study are discussed.

8.1 Main Findings

In light of the challenges discussed in this study and the recognised role of performance as a priority area to strengthen human resources for reproductive, maternal, and child health in Sudan, the current research aimed to develop a practical measure of performance for a newly introduced community midwife cadre in Sudan. The main research findings are summarised below, mapped onto each objective of the thesis:

8.1.1 Objective 1: To determine what factor(s) are most commonly used to measure 'performance' of maternal health workers in LMICs

The results of the systematic literature review identified 16 constructs used as measures of performance, reflecting the significant variation in how we come to understand and measure the performance of RMCH in LMICs. The constructs most commonly identified as components of performance measurement included quality of care, knowledge, skills, competency, compliance, and self-efficacy. Other constructs, including motivation, supervision, job satisfaction, burnout, and workload, were also identified but were more often referred to as 'impacting' on or 'influencing' performance, rather than as direct measures of performance. The results of the systematic review suggest several quantitative, qualitative, and mixed-method approaches to measure performance among reproductive, maternal, and child health cadres in LMICs. Likert self-report scales were most often used to measure constructs such as motivation and job satisfaction. Observational checklists, focus group discussions, in-depth/semi-structured interviews, case-vignettes, and observed simulated patient were among the qualitative tools used alone, and in conjunction with the quantitative tools, in the case of a mixed-method approach. The need to develop, adopt and adapt performance measures to context and job-specific tasks was highlighted.

8.1.2 Objective 2: To determine what factor(s) should be used to measure 'performance' of community midwives (CMWs) in Sudan

The results of the systematic literature review were followed by an exploratory study to contextualise further and determine the factors that constitute the performance of CMWs in Sudan. Stakeholders identified the performance of CMWs in Sudan as consisting of three primary constructs: namely, knowledge, competency, and compliance. Determinants of performance identified were either contextual or individual factors. Contextual determinants reflected aspects of the demand side of the health system that would influence the performance of the CMW, including socio-cultural health beliefs, diet norms, access to clean water; family planning taboos; financial hardship, and choice of healthcare and maternal health worker mistreatment. Key informants further identified the remuneration, quality of training of the CMWs, work environment, access to health facilities, and availability of consumables, as supply-side performance determinants. Individual factors, on the other hand, included seven components indicative of CMW motivation. These included pride, appreciation, and happiness in helping others, saving lives, and combating harmful traditional practices. Also, personal experiences, such as losing a loved one due to the unavailability of health personnel, further motivated them to perform as CMWs.

Taken together, and consistent with the results of the systematic literature review, key informants and RH state, coordinators agreed that performance measurement should use both quantitative and qualitative methods. Also, consideration had to be given to both contextual and individual factors. Consistent with existing models, including Waldman's (1994) Theory of Work Performance and Mitchell's (1997) Model of Job Performance. Stakeholders expressed that job performance is affected by both person factors (i.e., individual differences) and systems factor (i.e., situational variables).

8.1.3 Objective 3: To develop a contextually-relevant tool to measure performance among community midwives in Sudan

Aligned to implementation research, the results of the participatory consultative process of prioritisation of the primary constructs identified were used to develop the initial version of the CMW Performance Measurement Tool. Of the 16 constructs identified from the SLR of performance measures of maternal health

workers in LMICs, only six constructs were ultimately included as a priority measure of performance among CMWs in Sudan. Three of these constructs were intended as measures of performance (competency, knowledge, and compliance) and three of these were considered important determinants of performance (supervision, job satisfaction, and motivation). The tool further followed a continuum of care approach, antenatal, natal, postnatal care and family planning methods, whereby answers were solicited using a combination of open-ended, non-leading questions in an interview format. Also, the competency questions were identified as best answered by demonstration, use of manikin and direct observation of the detection of vital signs.

8.1.4 Objective 4: To assess the construct validity of the tool to measure performance among community midwives in Sudan

The tested performance scale consisted of three determinants of performance as motivation, job satisfaction and supervision, and a nine-item, three-factor correlated solution consisting of 5-items capturing those dimensions that measure competencies and 4-items that measure knowledge. The factor analyses performed on the scales measuring determinants of performance: Job Satisfaction, Motivation, and Perceived Supervision yielded good model fit. The results of the regression analysis was contrary to our hypothesised nature of the correlations between these determinants and the measure of performance, whereby an inverse relationship was observed between CMW performance constructs and its determinants in the low-resource setting of Sudan.

8.2 Research Contributions

8.2.1 Theoretical contribution of the Study

This study contributes to our growing understanding of performance and potential ways of measuring performance among maternal and child healthcare providers. It is important to note that most performance theories, scales, and tools are developed in the North and exported to the Global South (Borman & Motowidlo, 1997; Campbell, 1990; Murphy, 1989; Viswesvaran, 1993). The assumption being that these same performance definitions, domains, and factors are also relevant and applicable to health workers in the global south, despite

these health workers often operating as different cadres, in entirely different contexts, with different modalities, resources, and administration.

The measure of performance developed in the study further advances our understanding of contextual performance theories and how it compares and contrasts with existing theories. While the performance model adopts the common understanding of performance being comprised of contextual and task performance, it differs in the positioning of availability, accessibility and acceptability of the health cadre as a pre-requisite, and not part of its makeup. Furthermore, it assumes job satisfaction and motivation as determinants rather than domains of performance. In addition, the current study evidences that no performance measure should be without the consideration of the context and health system the cadre operates in. Acknowledging the fact that the tool needs to be located within a wider system performance evaluation, prerequisiting health system assessment prior to the use of the CMW individual performance assessment tool.

The CMW Performance Tool, developed using participatory approaches with key stakeholders and frontline health workers in Sudan, puts forward a tool comprised of a set of observable variables to measure performance among community midwives. Following further validation, this tool has the potential to be applied in other similar contexts, as a more contextually relevant measure of performance towards achieving UHC. The study results suggest that the performance of CMWs in Sudan is best conceptualised by knowledge, competency, job satisfaction and motivation factors. Each item developed under each sub-scale and question modality further reflected a contextual understanding of performance. More research however, is required in order to further test the validity of this measure and to assess its transferability to other maternal health providers working in a similar context.

8.2.2 Methodological contribution of the Study

The adoption of a systems-thinking approach to the application of an implementation research project to develop a practical measure of performance is a further essential contribution of the study. In specific, using a systematic literature review to inform a participatory formative qualitative study and

contextualising findings through key informant interviews and focus group discussions, before testing these findings using factor analyses, represents both good practice and a rigorous scientific approach to scale development.

8.2.2.1 Evaluation of Implementation Research (IR)

IR success is measured by several results, based on several fundamental principles and characteristics. Specifically, IR outcomes should be (i) acceptable to the community, beneficiaries and relevant stakeholders under study, (ii) adopted by them, (iii) appropriately fit for the particular setting and or target group, (iv) feasibly executed in the particular setting or organisation, (v) with high fidelity that what was designed was implemented, at (vi) reasonable implementation cost, (vii) with good coverage within the targeted population and that these results are (viii) maintained, or sustainable (Peters, 2013, 2014; Proctor, et al., 2011). The study followed all official channels, engaged all relevant stakeholders, continuously gave feedback, and presented back results as generated. In line with implementation research, these participatory approaches contributed to the resulting CMW Performance tool being adopted by the Federal Ministry of Health in Sudan. It has since proposed for use at Federal and state levels.

8.2.3 Implications for Policy and Practice

Decentralised health systems, scarcity of resources, and poor working environments continue to pose a challenge for the performance and retention of health workers within hard-to-reach and rural areas. Also, capital and state cities continue to attract the majority of health workers, where they can train and work in facilities that are better managed and equipped. Despite all efforts, the implementation of maternal, newborn and child health programmes in Sudan is confronted by many challenges, including: (i) unclear policies concerning practice regulation and inadequate financial resources, (ii) inadequately functioning health system, with weak referral systems, especially during obstetric and neonatal emergencies, (iii) suboptimal logistics system for management of drugs, family planning commodities and equipment, and (iv) lack of co-ordination amongst partners. The reality for CMWs operating in a low-resource setting such as Sudan is often much worse. Most frontline personnel do not receive a basic salary, or consumables to perform their duties. These factors also impact on the performance of health workers in Sudan.

Though evidence exists for the effectiveness of health worker performance improvement strategies (Kruk, Pate, & Mullan, 2017; National Academies of Sciences, 2015), there is a persistent debate in the literature as to how improved performance is best achieved in LMICs. The most commonly evaluated interventions include firstly, support-systems and payment of incentives, job-related interventions, including continuing education, improved supervision, creation of an enabling environment by decentralising human resource management (HRM) functions and by regulations, and interventions addressing all three levels of the micro, meso, and macro factors, as described in Chapter 2 (section 2.3) (Chopra, et al., 2008; Haines, Kuruvilla, and Borchert, 2004; Rowe, et al., 2005; Siddiqi 2005).

The latter often includes different HRM components such as training, distributing job aids, system strengthening, and quality improvement interventions (Dieleman, Gerretsen, & van der Wilt, 2009). Thus, the need to build, strengthen, and enhance health systems at the state, district, locality, and community level is essential. The CMW Performance Measurement Tool acts as an initial tool that could be used and further developed to be applied to all CMWs at a locality level as a way to monitor and evaluate their performance preceded by a health system analysis. Measures on levels of job satisfaction and motivation for example, can be used to track how CMWs are feeling towards their work and as a starting point to better reflect on what could be improved and to advocate for more resources within their work, PHC center and locality.

The current study shows the extent to which CMWs as a cadre are in practice similar to CHWs in many instances. In general they are chosen from their community to be trained as a health care provider to return and work there, building and strengthening a sense of trust, pride and belonging (Kok et al, 2017). They provide curative care to hard-to-reach communities as the first point of contact between the community and health system (Lewin et al, 2010). As frontline community outreach health cadres as CHWs or CMWs play a leadership role within their communities. They are perceived as role models and are looked up to, in matters related to health in particular and social matters in general, providing also a cultural broker role (Perez LM, Martinez J., 2008; Saprii, 2015). Other similarities include their 'agent of change' roles, in how they are trained to conduct health promotion and prevention activities to deliver community

seminars, door-to-door visits and assist in health campaigns as the expanded program for immunization (EPI) campaigns, distribution of impregnated mosquito bed-nets and combating harmful traditional practices as female genital mutilation, to count few. Along these lines, several recommendations are suggested to improve RMNCH service delivery and CMW performance in Sudan based on the results of this study. Initially, attention should focus on the future of all three UHC cadres: the community health worker (CHW), medical assistant (MA) and community midwife (CMW), regarding the CMW:

1. Support-system payment of incentives:

- Deployment Policy: Firstly, and while production rate reached >90% of the targeted need, these cadres remain unemployed, unevenly distributed, disincentivised and ill-equipped to deliver the integrated PHC package of health services. Although Presidential decrees have been announced and deployment encouraged, no clear federal policy exists to date. Therefore, immediate policy development, enforcement, and action to map, re-distribute, and deploy these cadres are needed to ensure that the health workforce produced are deployed to achieve their duty in providing health care services, and to meet the pre-requisite factors of availability and accessibility.
- Decreasing CMW workload is also recommended, as CMWs are expected to co-lead immunisation campaigns, nutrition, malaria, and tuberculosis outreach activities in many communities. Also, a performance-based incentive scheme based on their actual performance should be initiated.

2. Job-related interventions, including continuing education, improved supervision:

- CPD courses: CMWs should be exposed to refresher courses and regular, continuous professional development (CPD) to refresh, maintain and enhance their level of knowledge, competencies, and compliance, to enhance their job satisfaction and to improve their performance.
- Supportive supervision: regular supportive supervision visits should be initiated and maintained. Many of the CMWs were never supervised nor given constructive feedback, potentially explaining the absence of a

correlation found between these factors. This is due to many factors, including the scarcity of health visitors that are meant to supervise them and the unavailability of resources, including vehicles, petrol, roads, and incentives for the supportive supervision visits to take place with the CMWs in their respective villages. The Performance Measurement tool developed if and when enrolled within the community will be of great benefit in determining weak areas of supervision, and developing CPD courses to address the shortcomings and tailor relevant solutions for weak areas of performance.

3. Creation of an enabling environment by decentralisation of human resource management (HRM) functions and by regulations

- CMW Career pathway: a clear career pathway should be set for the CMWs to manage their expectations. So far, many initiatives to upgrade the CMWs to assistant health visitors have been discussed and semi-developed. The matter is of rising concern among ambitious CMWs who are already seeking alternative jobs, increasing the drop-out rate, and threatening the continuity of the programme and cadre.

4. Interventions addressing all three levers of the micro, meso and macro factors

- Health System Strengthening: many of the CMWs could not perform neonatal resuscitation, nor take vital signs correctly as either they were never given an Ambu bag, thermometer or sphygmomanometer, or those that had been given had broken equipment that was never replaced. Furthermore, the essential equipment, consumables, and life-saving drugs are scarce and unavailable in many instances. Their availability differs substantially across states, districts and villages, depending on the availability of a health facility and its status. Therefore, the need to provide all of the necessary resources for the CMW to carry out her work is essential for her performance.

8.3 Limitations and Suggestions for Future Research

8.3.1 Exploratory Phase

Despite its merits, this study is not without limitations. When I started the study, Sudan was in a stable state. Midway after the fieldwork and data collection, a cholera outbreak hit a number of the Southern states, including the White Nile state. Furthermore, conflict re-emerged in the western Darfur states, resulting in the exclusion of the five Darfur states in the second phase of data collection. Within the last year of the study, the country underwent civil unrest and revolution that overthrew a 30-year long regime, therefore, creating further instability, conflict, geopolitical fluctuations, and further affecting the research process. In addition to these logistical issues, the fundamental limitations of this study relate to reporting and response bias, scale development, validation, and statistical limitations.

8.3.2 Tool development phase: Reporting and Response Bias

The current study was heavily reliant on key stakeholder feedback, experience, and opinions. Moreover, the CMWs self-reported on the determinants of performance measures therefore, increasing the risk of social desirability bias (Becker, Bryman, & Ferguson, 2012) and common method bias. Through efforts made to build rapport with the CMWs challenges arose regarding the:

- Concept/meaning of both the job satisfaction and motivation constructs whereby both constructs were found to be new to the culture, and such concepts were never explored or investigated among CMWs in this context.
- CMWs mentioned that they were not used to being asked questions about how they felt, nor asked to reflect on statements in motivation, job satisfaction, and supervision before. Again, this is a cultural issue ingrained in the country context. Where culturally stating your thoughts/reflections on the statement is considered unthankful or ungrateful behaviour towards the community and God (Allah). Therefore, there is a need for future research on similar and other health cadres to solicit further contextual understanding of the measures and the factors proposed.
- Furthermore, the unavailability of performance appraisal reports or records within the health institutions was an extra challenge, i.e., weak human resource management measures, and system and meant that I could not

draw on these to inform the performance indicators developed as part of this exploratory stage.

8.3.3 Tool validation phase: Statistical Limitation

In general, the majority of scales used to measure maternal health workers' performance were developed and validated in the northern hemisphere and high-income settings. In addition, validation of scales carry their own challenges and require larger samples (Anthoine, et al., 2014), which was not possible due to uprising conflict, instability and Cholera outbreak within the identified study areas/states. Factor analysis also carries a number of limitations, including the sample size, such as state or nation surveys which affects the precision of estimations, therefore, requiring a large number of participants (Valluzzi, Larson, & Miller, 2003). Also, factorial validity is only one component of the validation process and there's a need for future studies to explore the concurrent, discriminant and predictive validity of the scale as other key steps in the validation process. The performance scale was tested on 180 community midwives (CMWs), in two different states; therefore, replication is necessary. Furthermore, the scarcity of similar research in Sudan and similar contexts related to the current study limits further comparison and interpretation.

8.4 Conclusion

Despite the urgency and importance of improving and enhancing health worker performance to attain universal health coverage in the Sustainable Development Goal (SDG) era, how performance is measured varies significantly within the literature. Consequently, no consensus currently exists for how performance should be best measured among community cadres for RMNCH. Evidence shows that there is no universal agreement on what constitutes performance, nor is there agreement on what defines a well-performing health worker. What scholars appear to agree on, however, is that performance is complex and can be observed through behaviour, multi-factorial or multidimensional, and influenced by several individuals and broader, system-level, determinants.

Moreover, there appears to be a general agreement that performance measures should consider how performance is defined within a specific role and that chosen performance indicators should be indicative of the tasks and responsibilities assigned to this role. Therefore, in measuring performance in similar and other health worker cadres, a similar approach is required. This research proposes a CMW performance tool, which requires further validation procedures.

Health worker performance definitions, models, domains, factors, and determinants are largely based on theories imported from the Global North. Therefore, any performance measure development needs to incorporate an in-depth contextual understanding of local definitions, perceptions, and understandings of the construct(s) to be measured. Therefore, in assessing the performance of health workers within a specific setting, there is a need to engage in an in-depth, highly consultative process to determine what factors comprise performance for this cadre, in this context, and what indicators are best placed to measure the same. Implementation research, as a methodological approach, offers a useful methodology to explore further and generate contextually rich studies on performance. The framework and tool developed by this research can act as a guide for further studies to explore performance among other cadres in the health profession, further contributing to our understanding of health worker performance for RMNCH in LMICs.

The CMW Performance Tool, developed using participatory approaches with key stakeholders and frontline health workers in Sudan, is an initial tool comprised of a set of observable variables to measure performance among community midwives. Following further validation, this tool has the potential to be applied in other similar contexts, as a more contextually relevant measure of performance towards achieving UHC. The study results suggest that the performance of CMWs in Sudan is best conceptualised by 'know-how' and 'know-what', i.e., knowledge and competency factors, taking into consideration its determinants of job satisfaction and motivation. Each item developed under each sub-scale further reflects a contextual understanding of performance.

Annex

Annex (1) Sudan Ethical Approval Letter

The Republic of Sudan
Federal Ministry of Health
Health Research Council
Research Directorate

بسم الله الرحمن الرحيم



جمهورية السودان

وزارة الصحة الاتحادية
مجلس البحوث الصحية
إدارة البحوث

Date: 29/12 / 2016

NATIONAL ENDORSEMENT

This is to certify that the Federal Ministry of Health is accepting the request of **Dr. Ayat Siddig Yousif Abuagla, from UNIVERSITY OF DUBLIN, CENTRE FOR GLOBAL HEALTH, TRINITY**, to conduct the study (No. 6 -12-2016) entitled (MEASURING PERFORMANCE AMONG COMMUNITY MIDWIVES IN LOW-RESOURCE SETTINGS: A MIXED-METHODS STUDY IN SUDAN).

Dr. Aman Abdalla Mustafa
Director, Research Directorate

العنوان : السودان. الخرطوم. وزارة الصحة الاتحادية. تقاطع شارع عثمان دقنة مع شارع النيل. الرمز البريدي: ١١١١١. ص.ب

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Tel: 00249- ١٥٧٨٤٥٧٧٣

Fax: 0249-0157861800

e-mail: fmohresearch@yahoo.com

Annex (2) Ethical Approval Trinity College Dublin



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Health Policy and Management
3-4 Foster Place
Trinity College
Dublin 2
Ireland

Centre For Global Health
7-9 Leinster Street South
Dublin 2, Ireland

09/12/2016

Measuring Performance Among Community Midwives in Low-Resource Settings. A Mixed-Methods Study in Sudan

Application: 17/08/16

Dear Ayat Siddig Yousif Abu-Agla,

Thank you for your submission of the above proposal to the HPM/CGH REC.

The REC has given approval to the proposed study.

Yours sincerely

A handwritten signature in black ink, appearing to read 'C. Normand'.

Professor Charles Normand
Chair of the HPM/CGH REC

An Coiste um Thaighde Eitice
An Lárionad Pholasai agus
Bhainistíocht
Sláinte/Lárionad na Sláinte Domhanda

3-4 Plás Foster, Semora 0.18,
Coláiste na Tríonóide,
Baile Átha Cliath 2, Éire

Research Ethics Committee
Centre of Health Policy and
Management/Cente for Global Health

3-4 Foster Place, Room 0.18
Trinity College,
Dublin 2, Ireland

T +353 (0) 1 896 2201
F +353 (0) 1 886 4956

hsmsec@tcd.ie
www.medicine.tcd.ie/
health_policy_Managment/

Annex (3)

Table (A1) Systematic Literature Review Article Quality Assessment Criteria

No.	Criteria	Yes=2	Partial=1	No=0	N/A
1	Question / objective sufficiently described?				
2	Study design evident and appropriate?				
3	Method of subject/comparison group selection or source of information/input variables described and appropriate?				
4	Subject (and comparison group, if applicable) characteristics sufficiently described?				
5	If interventional and random allocation was possible, was it described?				
6	If interventional and blinding of investigators was possible, was it reported?				
7	If interventional and blinding of subjects was possible, was it reported?				
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?				
9	Sample size appropriate?				
10	Analytic methods described/justified and appropriate?				
11	Some estimate of variance is reported for the main results?				
12	Controlled for confounding?				
13	Results reported in sufficient detail?				
14	Conclusions supported by the results?				
15	Question / objective sufficiently described?				
16	Study design evident and appropriate?				
17	Context for the study clear?				
18	Connection to a theoretical framework / wider body of knowledge?				
19	Sampling strategy described, relevant and justified?				
20	Data collection methods clearly described and systematic?				
21	Data analysis clearly described and systematic?				
22	Use of verification procedure(s) to establish credibility?				
23	Conclusions supported by the results?				
24	Reflexivity of the account?				

Annex (4) Participant Information Sheet

Participant Information Leaflet (*Interview*)

Research Title: Measuring performance among community midwives in low-resource settings: A mixed-method study in Sudan

Principal Investigator: Dr. Ayat Abu-Agla (Trinity College Dublin)

Supervisor: DR. FRÉDÉRIQUE VALLIÈRES (Trinity College Dublin)

This study is conducted in partial fulfilment of the International Doctorate in Global Health (INDIGO) at Trinity College Dublin

Expected Duration: December 2016- July 2017

Research Purpose and procedures: We are currently conducting a research that aims to develop a contextually relevant tool to measure the performance of community midwives in Sudan. Your expected participation in the study is through a series of questions answered an interview and is not to be followed by any procedure.

Should you agree to participate, your involvement would consist of three phases:

Phase I – Recruitment (December 2016)

During this phase you will be contacted by the researcher, where you will be informed about the full nature of this study as well as any risks involved in participating. You will be given an opportunity to ask questions. You will subsequently be given a minimum of seven days to consider whether or not you would like to participate.

Phase II- Interview (December 2016-January 2017)

After seven days, a member of the research team will contact you. You will be given the opportunity to ask any questions you may have regarding your participation. Should you agree to participate, you will be asked to give consent by signing an agreeing to our informed consent. You will be given a unique participant ID and a copy of your consent form for your own personal records. You will then be asked to answer a number of questions in an interview. The session should take no longer than 60-80 minutes to complete.

Risks and discomforts

You may be asked to answer some questions regarding your work that you find difficult to answer. There is also the potential risk of false expectations arising from you participation in this study. It is important that you understand that not all of the issues you bring up will be met as a result of your participation. No unforeseeable risks, discomforts or research-related injury is identified.

Potential benefits

Participating in this research will assist us in better understanding and developing a contextually relevant tool to measure performance among community midwives

in Sudan. The ultimate results of the study will later be shared with policy makers, aiming to benefit the cadre under study and reproductive health status in the country.

Alternative Procedures

Rather than participating in this study, you may prefer to speak directly to your supervisor, health facility manager or district health management team.

Provisions for confidentiality

The answers you provide through the interview are entirely confidential. This means that no one on the research team is permitted to talk to anyone about what you tell us. We will consider carefully your identity and the only documents that will bear your personal information as name, address and telephone number will only be on the consent form. An identity code will be generated for each participant, and any personal identifying information will be removed from raw data, such as interview transcripts. The identification key will be stored securely and separately from the main data. Only members of the research team as designated on the approved protocols will have access to raw data. The document bearing personal information will be stored in a locked cabinet at the Sudan Medical Specialization Board (SMSB) with access strictly restricted to personnel working on the study.

Voluntary participation and the right to discontinue participation without penalty

Your participation in this study is entirely voluntary and refusal to participate will involve no penalty or loss of benefits to which you are currently entitled. You may discontinue participation at any time without having to give a reason, and without any penalty or loss of benefits to which you are otherwise entitled. Any significant new findings developed during the course of the research that may relate to your willingness to continue participation will be provided to you.

Contacts for additional information

Should you have any questions you can call Dr Ayat Abu-Agla on her mobile: +353(87)3986406 or +249(9)12920891 for answers to pertinent questions about the research and your research rights, and in the event of a research-related injury to you.

Termination of participation by the principal investigator

In the event of any of the following the principal investigator reserves the right to terminate your involvement in the study:

- It is in your best interest to terminate your involvement. Protecting your safety and well-being takes precedence over the research protocol
- You are not complying with the study requirements. This includes being harmful towards any member of the research team
- If the study is discontinued

Permissions

The principal investigator (Ayat Abu-Agla) has obtained permission to conduct the study from the Sudan Medical Specialization Board. The study has also obtained ethical approval from the HPM-CGH Research Ethics Committee at Trinity College Dublin, as well as from the National Research Health Ethics Committee at the Federal Ministry of Health, Sudan.

Participant Information Leaflet (Focus Group Discussion)

Research Title: Measuring performance among community midwives in low-resource settings: A mixed-method study in Sudan

Principal Investigator: Dr. Ayat Abu-Agla (Trinity College Dublin)

Supervisor: DR. FRÉDÉRIQUE VALLIÈRES (Trinity College Dublin)

This study is conducted in partial fulfilment of the International Doctorate in Global Health (INDIGO) at Trinity College Dublin

Expected Duration: December 2016- July 2017

Research Purpose and procedures: We are currently conducting a research that aims to develop a contextually relevant tool to measure the performance of community midwives in Sudan. Your expected participation in the study is through a series of questions answered through a Focus group discussion and is not to be followed by any procedure.

Should you agree to participate, your involvement would consist of three phases:

Phase I – Recruitment (December 2016)

During this phase you will be contacted by the researcher, where you will be informed about the full nature of this study as well as any risks involved in participating. You will be given an opportunity to ask questions. You will subsequently be given a minimum of seven days to consider whether or not you would like to participate.

Phase II- Interview or Focus Group Discussion (December 2016-January 2017)

After seven days, a member of the research team will contact you. You will be given the opportunity to ask any questions you may have regarding your participation. Should you agree to participate, you will be asked to give consent by signing an agreeing to our informed consent. You will be given a unique participant ID and a copy of your consent form for your own personal records. You will then be asked to answer a number of questions when invited to join a focus group discussion. The session should take no longer than 60-80 minutes to complete.

Risks and discomforts

You may be asked to answer some questions regarding your work that you find difficult to answer. There is also the potential risk of false expectations arising from you participation in this study. It is important that you understand that not all of the issues you bring up will be met as a result of your participation. No unforeseeable risks, discomforts or research-related injury is identified.

Potential benefits

Participating in this research will assist us in better understanding and developing a contextually relevant tool to measure performance among community midwives in Sudan. The ultimate results of the study will later be shared with policy makers, aiming to benefit the cadre under study and reproductive health status in the country.

Alternative Procedures

Rather than participating in this study, you may prefer to speak directly to your supervisor, health facility manager or district health management team.

Provisions for confidentiality

The answers you provide through your participation in a focus group discussion are entirely confidential. This means that no one on the research team is permitted to talk to anyone about what you tell us. We will consider carefully your identity and the only documents that will bear your personal information as name, address and telephone number will only be on the consent form. An identity code will be generated for each participant, and any personal identifying information will be removed from raw data, such as interview transcripts. The identification key will be stored securely and separately from the main data. Only members of the research team as designated on the approved protocols will have access to raw data. The document bearing personal information will be stored in a locked cabinet at the Sudan Medical Specialization Board (SMSB) with access strictly restricted to personnel working on the study.

Voluntary participation and the right to discontinue participation without penalty

Your participation in this study is entirely voluntary and refusal to participate will involve no penalty or loss of benefits to which you are currently entitled. You may discontinue participation at any time without having to give a reason, and without any penalty or loss of benefits to which you are otherwise entitled. Any significant new findings developed during the course of the research that may relate to your willingness to continue participation will be provided to you.

Contacts for additional information

Should you have any questions you can call Dr Ayat Abu-Agla on her mobile: +353(87)3986406 or +249(9)12920891 for answers to pertinent questions about the research and your research rights, and in the event of a research-related injury to you.

Termination of participation by the principal investigator

In the event of any of the following the principal investigator reserves the right to terminate your involvement in the study:

- It is in your best interest to terminate your involvement. Protecting your

- safety and well-being takes precedence over the research protocol
- You are not complying with the study requirements. This includes being harmful towards any member of the research team
 - If the study is discontinued

Permissions

The principal investigator (Ayat Abu-Agla) has obtained permission to conduct the study from the Sudan Medical Specialization Board. The study has also obtained ethical approval from the HPM-CGH Research Ethics Committee at Trinity College Dublin, as well as from the National Research Health Ethics Committee at the Federal Ministry of Health, Sudan.

Annex (5) Informed Consent

INFORMED CONSENT FORM: (INTERVIEW)

PROJECT TITLE: MEASURING PERFORMANCE AMONG COMMUNITY MIDWIVES IN LOW RESOURCE SETTINGS: A MIXED-METHODS STUDY IN SUDAN

PRINCIPAL INVESTIGATOR: Dr. Ayat Abu-Agla (Centre for Global Health, Trinity College Dublin)

SUPERVISOR: Dr. Frédérique Vallères (Centre for Global Health, Trinity College Dublin)

BACKGROUND

The need to recruit, develop, train and retain health workers in low and middle income countries (LMICs) is key to achieving universal health coverage (UHC), while also valuing the concept of people-centered and integrated health services (UN, 2016). Despite strong efforts, challenges remain when it comes to addressing the global human resource for health (HRH) crisis. Many low-income countries failed to attain the health-related Millennium Development Goals (MDGs), with performance of health care providers identified as one of the main constraints (WHO, 2015). Similarly, it is estimated that an additional 40-50 million new health workers will be needed to achieve the Sustainable Development Goals (SDGs), where the shortage of health work force is cross-cutting through most of the SDG goals 1,2,3,4,5,8,10,11 and 17 (UN, 2016).

The Sudan is facing the same dilemma. The shortage of maternal health providers in particular, negatively reflects on the health system, disrupting the quality of service delivery and contributing to poor maternal health indicators. The country failed to reach the health-related MDGs 4, 5 and 6, with an infant mortality rate of 60/1,000 live birth and a maternal mortality ratio (MMR) of 216/100,000 live births. (FMoH-Sudan, 2011). To bridge the gap in health service coverage, the National Health Sector Strategic Plan (2012-2016) aimed to accelerate expansion and strengthening of primary health care services fostering the concept of universal health care coverage. The community midwife cadre presented as a new cadre to address the gap for 14,000 reproductive and maternal health care providers by the end of 2016.

Performance measurement has been identified as the weakest area in human resource management in Sudan. As a result, it was set as a National Health sector strategic objective targeted for improvement; identified as one of the strategic objectives of the national HRH strategy (FMoH-Sudan, 2012b) and as a research priority on the national HRH list (FMoH-Sudan, 2015). In the face of growing economic challenges, there is a need to develop practical, valid and contextually relevant tools to help track and measure performance.

You have expressed an interest in participating in the current study, which aims to provide a contextually relevant tool to measure performance among community midwives in low-resource setting, Sudan. In order to develop this understanding you will be asked a series of questions in an interview to reach to this conclusion with full assurance of confidentiality. The interview should take no longer than 60-80 minutes to complete. You have a right to read your transcripts.

CONFIDENTIALITY: The answers you provide through your participation in this study are entirely confidential. This means that no one on the research team is permitted to talk to anyone about what you tell us and likewise, we expect that you will not talk to anyone else about what is said during the interview. Your name will not be written on any form other than this consent form, which will be kept under lock and key in a locked cabinet. Your name will never be used in connection with the information you provide us. The interview will be recorded and subsequently transcribed. Your name will not appear on any transcription and only your participant number will be used to identify you. Transcripts from the interviews will be made available to you and will be stored in a safe location with only the research team having access to the data.

You reserve the right to contact the National Research Health Ethics Committee at the Federal Ministry of Health, Sudan if you sustain any research-related injury, at the following address: The National Research Health Ethics Committee, Directorate of Health Research, Federal Ministry of Health, Nile Avenue, Khartoum, Sudan

RIGHT TO DISCONTINUE: Throughout the course of the study, you do not have to answer any questions that you do not want to answer, and you may withdraw from the study at any time. Should you decide you no longer want to participate, this will not influence your work as a health worker, minister, or practitioner.

In the event of any of the following, the principal investigator reserves the right to terminate your involvement in the study: It is in your best interest to terminate your involvement, protecting your safety and well-being takes precedence over the research protocol; you are not complying with the study requirements, this includes being harmful towards any member of the research team and; if the study is discontinued. In the unlikely event of any of the above, you will be noticed and the reason for terminating your involvement will be given.

DECLARATION:

I have read, or had read to me, the information leaflet for this project and I understand the contents. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights. I understand that I may withdraw from the study at any time and I have received a copy of this agreement.

PARTICIPANT'S NAME:

CONTACT DETAILS:

PARTICIPANT'S SIGNATURE:

PARTICIPANT ID:

Date:

Statement of investigator's responsibility: I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

INVESTIGATOR'S SIGNATURE:..... **Date:**.....

DECLARATION:

I have read, or had read to me, the information leaflet for this project and I understand the contents. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights. I understand that I may withdraw from the study at any time and I have received a copy of this agreement.

PARTICIPANT'S NAME:

CONTACT DETAILS:

PARTICIPANT'S SIGNATURE:

PARTICIPANT'S ID:

Date:.....

Statement of investigator's responsibility: I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

INVESTIGATOR'S SIGNATURE:..... **Date:**.....

INFORMED CONSENT FORM: (Focus Group Discussion)

PROJECT TITLE: MEASURING PERFORMANCE AMONG COMMUNITY MIDWIVES IN LOW RESOURCE SETTINGS: A MIXED-METHODS STUDY IN SUDAN

PRINCIPAL INVESTIGATOR: Dr. Ayat Abu-Agla (Centre for Global Health, Trinity College Dublin)

SUPERVISOR: Dr. Frédérique Vallères (Centre for Global Health, Trinity College Dublin)

BACKGROUND

You have expressed an interest in participating in the current study, which aims to provide a contextually relevant tool to measure performance among community midwives in low-resource setting, Sudan. In order to develop this understanding you will be asked a series of questions in a focus group discussion to reach to this conclusion with full assurance of confidentiality. The discussion should take no longer than 60-80 minutes to complete. You have a right to read your transcripts.

CONFIDENTIALITY: The answers you provide through your participation in this study are entirely confidential. This means that no one on the research team is permitted to talk to anyone about what you tell us and likewise, we expect that you will not talk to anyone else about what is said during a focus group discussion. Your name will not be written on any form other than this consent form, which will be kept under lock and key in a locked cabinet. Your name will never be used in connection with the information you provide us. The focus group discussion will be recorded and subsequently transcribed. Your name will not appear on any transcription and only your participant number will be used to identify you.

You reserve the right to contact the National Research Health Ethics Committee at the Federal Ministry of Health, Sudan if you sustain any research-related injury, at the following address: The National Research Health Ethics Committee, Directorate of Health Research, Federal Ministry of Health, Nile Avenue, Khartoum, Sudan

RIGHT TO DISCONTINUE: Throughout the course of the study, you do not have to answer any questions that you do not want to answer, and you may withdraw from the study at any time. Should you decide you no longer want to participate, this will not influence your work as a health worker, minister, or practitioner.

In the event of any of the following, the principal investigator reserves the right to terminate your involvement in the study: It is in your best interest to terminate your involvement, protecting your safety and well-being takes precedence over the research protocol; you are not complying with the study requirements, this includes being harmful towards any member of the research team and; if the study is discontinued. In the unlikely event of any of the above, you will be noticed and the reason for terminating your involvement will be given.

DECLARATION:

I have read, or had read to me, the information leaflet for this project and I understand the contents. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights. I understand that I may withdraw from the study at any time and I have received a copy of this agreement.

PARTICIPANT'S NAME:

CONTACT DETAILS:

PARTICIPANT'S SIGNATURE:

PARTICIPANT ID:

Date:

Statement of investigator's responsibility: I have explained the nature and purpose of this research study, the procedures to be undertaken and any risks that may be involved. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

INVESTIGATOR'S SIGNATURE:..... **Date:**.....

**MEASURING PERFORMANCE AMONG
COMMUNITY MIDWIVES IN LOW-RESOURCE
SETTINGS: A MIXED-METHODS STUDY IN
SUDAN**

Semi Structured Interview Guide

Contents

1. Introduction
 - 1.1 Purpose
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 - 2.3 Additional Directions
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 - 3.1 Introduction - Explanation of Project
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 - 3.3 Ice Breaker
 - 3.4 Dialogue of Required Topics to Cover
 - 3.5 Closing Q&A

1. Introduction

The researcher will conduct a series of one-on-one interviews. This study will contribute to existing knowledge by developing a validated, contextually relevant, tool to measure performance of community midwives in the Sudan. In the short term, it is expected that results of this study will be used to inform national policy, management and training programs, while also contributing to the growing literature in the area of health worker performance. In the long-term, it is expected that the results of this study will contribute to better performance monitoring to better inform human resource management.

1.1 Purpose

The aim of this study is to develop a practical measure of performance among community midwives in low-resource settings

More specifically we will want to:

- To determine what factors constitute the good performance of community midwives in the Sudanese setting
- To develop a contextually-relevant tool to measure performance among community midwives in Sudan
- To validate a tool to measure performance among community midwives in Sudan

1.2 Notation/Structure

Achieving universal health coverage, designing people centred health systems and meeting the Sustainable Development Goals represent key modern-day challenges. This study will contribute to existing knowledge by developing a validated, contextually relevant, tool to measure performance of community midwives in the Sudan.

The semi structured interviews will be used to develop a better understanding on the status of reproductive and maternal health in the Sudan; to address the identified bottleneck of performance measurement by; identifying the perception/definition of performance of community midwife, and what factors constitute good performance of a community midwife and propose factors to measure it, given the country context.

2. Interview Planning and Coordination

2.1 Targeted Participants

The respondents for the semi structured interviews are decision makers from the following institutes:

1. Federal Ministry of Health: Human Resources Development Directorate- Director General
2. Federal Ministry of Health: Primary Health Care Directorate- Director
3. Federal Ministry of health: Reproductive Health Directorate- Director
4. Federal Ministry of Health: Nursing and Midwifery Directorate- Director
5. White Nile State Ministry of Health: Nursing and Midwifery Directorate- Director
6. Community M
7. idwife Training body : Academy of Health Sciences– Director
8. Community midwife Curricula development representative
9. INGOs: UNFPA/ UNICEF/WHO: technical officer- involved in curricula development and training of the community midwife
10. Community midwife senior instructor
11. Community midwife supervisor
12. Professional union representative
13. Expert in the field of human resources for health in Sudan
14. Expert in the field of reproductive and maternal health in Sudan(+former director whom wrote the previous RMH strategy 2010-2015)

2.2 Interviewees and Schedule

Date	Time	Anonymous ID

2.3 Additional Directions

- Forty five minutes will be allotted per semi structured interview.
- The interviewer will facilitate the discussion not lead it.

3. Interviewer Guide and Script

3.1 Introduction - Explanation of Research

First, I would like to thank you for participating in this study. The goal of the interview is to obtain your opinion and to get your ideas of the reproductive and maternal health status in Sudan, how you define performance of a community midwife (as a health worker); and how to measure performance of community midwives by identifying the factors that constitute good performance. The valuable comments and suggestions you provide today will inform the development of a contextually relevant tool to measure performance.

All information collected will be confidential and interviewee's name will be disclosed. I hope this encourages you to speak openly. (Informed consent + Participant Information leaflet attached)

3.2 Ground Rules

In the next 45 minutes, I will be taking notes and record taping the interview. I would like you to contribute as much as possible, as it will help to reflect on how to measure performance of community midwives in a setting as Sudan.

3.3 Dialogue of Required Topics to Cover

- Key questions
 - **Top Level Issue: Performance of community midwife:** The need to strengthen performance of the health workforce has been identified at international level being set as a strategic objective in the Global HRH strategy: 2030 workforce. Furthermore, nationally performance has been identified as a bottleneck, a weak area in human resource management in the country and consequently, set as a national strategic objective in both the national health sector strategic plan and national HRH strategy. To address this bottleneck, we would first like to define performance in order to determine what factors constitute the good performance of community midwives in the Sudanese setting to measure:
 1. How would you define performance of a community midwife?
 - Probe 1:** What characteristics make up performance?
 - Probe 2:** What context determines/influences/affects performance? (work environment: home; delivery kit; records)
 2. What does a well performing community midwife mean to you?
 - Probe 1:** Competency set of skills
 - Probe 2:** Responsibilities
 3. If you were to measure performance of a community midwife, what characteristics would you measure?
 - Probe 1:** How?
 - Probe 2:** why?
 - Probe 3:** when?

- **Top Level Issue: Reproductive and Maternal health (RMH) status:** The status of reproductive and maternal health in Sudan is complex. The country failed to reach the health-related MDGs4, 5 and 6, with an infant mortality rate of 60/1,000 live birth and a maternal mortality ratio (MMR) of 216/100,000 live births (FMoH-Sudan, 2011), with that in mind:
4. **Reproductive and Maternal Health Cadres:** What is the current status of RMH cadres in Sudan,
 - Probe 1:** who are they?
 - Probe 2:** How many?
 - Probe 3:** Is there a skill mix balance? In which RMH cadres?
 - Probe 4:** Are they geographically well distributed?
 5. **Universal Health Coverage/Health expansion program and Reproductive and Maternal Health:** Does the current UHC approach address RMH needs?
 - Probe 1:** If so, how and to what extent?
 - Probe 2:** Which other RMH policies or strategies exist? How effective are they?
 6. **Community Midwife:** what is a community midwife?
 - Probe 1:** Why was the community midwife cadre developed?
 - Probe 2:** What is she expected to know? Trained to do? Competency; skills; knowledge; behavior) (ICM def: Competency (midwifery): A combination of knowledge, professional behaviour and specific skills that are demonstrated at a defined level of proficiency in the context of midwifery education and Practice.
 - Probe 3:** What does she do? Fit for practice?

3.4 Closing Q&A

Thank you for your time, any questions.

COMMUNITY MIDWIFE COMPETENCIES (CURRICULA+ICM)

1. COMPETENCY IN SOCIAL, EPIDEMIOLOGIC AND CULTURAL CONTEXT OF MATERNAL AND NEWBORN CARE: Midwives have the requisite knowledge and skills from obstetrics, neonatology, the social sciences, public health and ethics that form the basis of high quality, culturally relevant, appropriate care for women, newborns, and childbearing families.
2. COMPETENCY IN PRE-PREGNANCY CARE AND FAMILY PLANNING: Midwives provide high quality, culturally sensitive health education and services to all in the community in order to promote healthy family life, planned pregnancies and positive parenting.
3. COMPETENCY IN PROVISION OF CARE DURING PREGNANCY: Midwives provide high quality antenatal care to maximize health during pregnancy and that includes early detection and treatment or referral of selected complications.
4. COMPETENCY IN PROVISION OF CARE DURING LABOUR AND BIRTH: Midwives provide high quality, culturally sensitive care during labour, conduct a clean and safe birth and handle selected emergency situations to maximize the health of women and their newborns.
5. COMPETENCY IN PROVISION OF CARE FOR WOMEN DURING THE POSTPARTUM PERIOD: Midwives provide comprehensive, high quality, culturally sensitive postpartum care for women.
6. COMPETENCY IN POSTNATAL CARE OF THE NEWBORN: Midwives provide high quality, comprehensive care for the essentially healthy infant from birth to two months of age.
7. COMPETENCY IN FACILITATION OF ABORTION-RELATED CARE: Midwives provide a range of individualised, culturally sensitive abortion-related care services for women requiring or experiencing pregnancy termination or loss that are congruent with applicable laws and regulations and in accord with national protocols.
8. Engage in social activities with the health team and civil based organisations in the field of reproductive and maternal health to promote health education for women and their families

KEY/IMPORTANT RESPONSIBILITIES OF COMMUNITY MIDWIFE (CURRICULA+ SUPPORTIVE SUPERVISION+ICM)

1. Bind to the ethics and profession of midwifery
2. Apply evidence-based midwifery practices (*ante natal, delivery, postnatal and puerperium (danger signs), neonatal and child care*)
3. Engage in health promotion (*environmental health and WASH*); disease prevention (*endemic diseases; malaria, bilharzia, diarrheal disease*) and vaccination for community service (+ *promote nutritious status of mother and children*)
4. Understand the role of the community midwife in administration and management tasks and activities, including quality and human resource management, appropriate for level of health facility in health care
5. Mobilise community leaders and members towards enhancing reproductive health

6. Engage in primary health care services(*FP, HTPs, Safe motherhood, STI& AIDs, other RH issues*)
7. Partner with the health team and all health workers at the nearest health institute to her village and to report to them
8. Aware of self-learning concept

**MEASURING PERFORMANCE AMONG
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Focus Group Discussion Guide

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 - 3.4 Dialogue of Required Topics to Cover
 - 3.5 Closing Q&A

4. Introduction

The researcher will conduct a number of focus group discussions. This study will contribute to existing knowledge by developing a validated, contextually relevant, tool to measure performance of community midwives in the Sudan. In the short term, it is expected that results of this study will be used to inform national policy, management and training programs, while also contributing to the growing literature in the area of health worker performance. In the long-term, it is expected that the results of this study will contribute to better performance monitoring to better inform human resource management.

4.1 Purpose

The aim of this study is to develop a practical measure of performance among community midwives in low-resource settings

More specifically we will want to:

- To determine what factors constitute the good performance of community midwives in the Sudanese setting
- To develop a contextually-relevant tool to measure performance among community midwives in Sudan
- To validate a tool to measure performance among community midwives in Sudan

4.2 Notation/Structure

Achieving universal health coverage, designing people centred health systems and meeting the Sustainable Development Goals represent key modern-day challenges. This study will contribute to existing knowledge by developing a validated, contextually relevant, tool to measure performance of community midwives in the Sudan. The focus group discussion will be used to develop a better understanding on how mothers- beneficiaries of the community midwife service perceive the health care they perceive

5. Focus Group Planning and Coordination

5.1 Targeted Participants

The participants for the focus group discussion research exercise should meet the following criteria

- Females 100%
- 18-44 years old
- Residing Khartoum or White Nile State
- received reproductive and maternal health services from a community midwife
- 2 FGDs each will be held in both states of Khartoum and White Nile
- 2 FGDs will target young mothers and the other 2 FGDs will target grand multi paras
- Vaccination clinic/ immunization campaign (to capture the one not accessing the service)/ ANC clinic

5.2 Attendees and Schedule

Date	Time	Anonymous ID

5.3 Additional Directions

- 60 to 80 minutes will be allotted per focus group and screen between 8 to 10 participants.
- The moderator will facilitate the discussion not lead it.
- Ten-twenty minutes will be allowed for each discussion topic. The participants will be announced when both 5 minutes and 10 minutes remain so that they are aware of the time left to contribute their thoughts.
- Judgment will be used to determine if the topic is providing valuable data and need to adjust the amount of time spent on that particular topic.
- Encouragement of each participant to speak equally. To call on participants that are not contributing as much to the discussion.
- Participants may speak up when they have difference of opinion, rather than agreeing with everyone else's opinions and values.
- Paper and pen will be provided to participants for the icebreaker and for additional notes they may want to take throughout the focus group.

6. Moderator Guide and Script

6.1 Introduction - Explanation of Research

First, I would like to thank you for participating in this study. All information collected will be confidential and participant's name will be disclosed. I hope this encourages you to speak openly (Informed consent + Participant Information leaflet attached).

Explain the presence and purpose of recording equipment

6.2 Ground Rules

In the next 60 to 80 minutes, I will be taking notes and record taping your discussion. I would like everyone to talk and contribute as much as possible.

6.3 Ice Breaker – 2 Facts about Yourself

Opening question (Ice breaker)

Each person writes down 2 facts about themselves, including their favorite color and food. Each person takes turns reading their answers aloud and the rest of the participants.

OR each person gives themselves a fake name (add name tag) P1, P2,....

6.4 Dialogue of Required Topics to Cover

- Key questions (Road map strategy 2010-2015+community midwife curricula+ supportive supervision+ a universal truth report (GHWA 2014) + WHR06)

Use differences of opinion as discussion topics:

- **Top Level Issue: Perception on Reproductive maternal health (RMH) and services**

Probe 1: What does having a healthy pregnancy and child birth mean to you?

Probe 2: Why did you come to the health facility (Antenatal care, delivery, post-natal care and puerperium, FP, Neonatal and child care)? And how often do you come?

Probe 3: **What are your expectations when you came here today?** (What type of maternal health services do you expect to get here?)

- **Top Level Issue: Quality of reproductive and maternal health care provided**

Probe 1: **Where your expectations met? If yes, How? If no, why not?** (Can you share how your visit went, what happened? What type of service did the community midwife provide?)

Probe 2: **What did your community midwife, tell you about:**

- a Birth preparedness plan;
- Knowledge of danger signs of obstetrics and neonatal complication;
- Knowledge of family planning;
- **What other than breast milk do you give your child?** (Knowledge of breast feeding (exclusive 0-6months, continued 6-9moths); Timely complimentary feeding)

Probe 3: what skills/ competencies/characteristics do you think a community midwife should have? Why? (Perceived competencies and dynamics of the visit)

Probe 4: what about the quality of care provided by the community midwife (respect, no discrimination, good communication and empathy). (I what to know, if she was satisfied?

- **Top Level Issue: Acceptability of the Community midwife**

Probe 1: Would you tell the community midwife what you feel/ your complaint? (Characteristics and ability of the community midwife to treat all patients with dignity, create trust and enable or promote demand for services)

Probe 2: do you understand what she says?

Probe 3: what does a community midwife mean to you? (behaviour is respectful according to age, religion, and social and cultural values etc.....)

6.5 Closing Q&A

Thank you for coming any questions and answers.

What are your expectations when you came here today?

Where your expectations met? If yes, How? If no, why not?

What did your community midwife, tell you about:

- a Birth preparedness plan;
- Knowledge of danger signs of obstetrics and neonatal complication;
- Knowledge of family planning;
- **What other than breast milk do you give your child?** (Knowledge of breast feeding (exclusive 0-6months, continued 6-9moths); Timely complimentary feeding)

What do you want from a CMW? What are the characteristics of a CMW?

What do you think a good CMW should do?

What is a strong performing CMW?

Annex 7

Table (A2) maternal health worker: name- entry requirement-years of training-description of task

Name of MHW	Description	Articles
Community/Public health/ Auxiliary/Midwives	<ul style="list-style-type: none"> providing family planning services, antenatal care, postnatal care, and child immunization ANC, labour and delivery and EmONC, maternal, newborn, and child health services. providing domiciliary care to mothers, children and women within the community; Breast cancer prevention and screening 	(Agha, 2010), (Ansari, Zainullah, Kim, Tappis, Kols, Currie, Haver, van Roosmalen, Broerse, & Stekelenburg, 2015), (Aragaw et al., 2015), (Cagan & Gunay, 2015), (Canchihuaman et al., 2011), (Diedhiou et al., 2015), (Dumont et al., 2013), (Duysburgh et al., 2016), (Grady et al., 2011), (Goudar et al., 2013), (Jayatilleke et al., 2015), (Kambala et al., 2017), (Kildea et al., 2012), (Lakhani et al., 2016), (Mirkuzie, Sisay, Reta, et al., 2014), (Morrison et al., 2015), (Ohnishi et al., 2007), (Oncel et al., 2007), (Pitchforth et al., 2010), (Saber et al., 2016), (Sadodin et al., 2016), (Tetui et al., 2012), (Traoré et al., 2014), (Vithana et al., 2013), (Vivio et al., 2010), (D. Walker et al., 2012b)
Nurse-midwives	ANC, PMTCT, HIV/AIDS Service Provision, delivery,	(Andreatta et al., 2011), (W. A. Carlo et al., 2009), (Gross et al., 2011), (Jennings et al., 2010), (Y. M. Kim et al., 2013), (Nyango et al., 2010), (Ratcliffe et al., 2016), (Thu et al., 2015)
Nurse	ANC, PMTCT, HIV/AIDS Service Provision Essential Obstetric Care, abortion/post-abortion care	(Aung et al., 2015), (Cagan & Gunay, 2015), (Chaturvedi et al., 2014), (Forchheh & Fako, 2007), (M. E. Kruk et al., 2016), (Nikiema et al., (Smit et al., 2009), (Sotunsa et al., 2016), (Walton et al., 2016), (Zhang et al., 2015)
Enrolled nurse	performing tasks traditionally undertaken by doctors and registered nurses/midwives	(McAuliffe et al., 2009)
Lady Health Visitor/ worker	Conducts deliveries at household and facility level, and provides immediate new-born care.	(Aragaw et al., 2015), (Rabbani et al., 2015), (Sheikh et al., 2016)
AYUSH		(Chandhiok et al., 2015)
Semi/ Skilled birth attendant	routine delivery care, emergency obstetric care (EmOC), emergency new-born care (EmNC) and non-medical quality	(C. L. Evans et al., 2014), (Kabo et al., 2016), (Nesbitt et al., 2013), (Partamin et al., 2012)
Maternal and Child Health Aides	2 year training, provide antenatal and postnatal care, family planning services, counselling and treatment of sexually transmitted infections, but also attend normal deliveries commonly occurring at the dispensaries and health centres.	(Pembe et al., 2010)
Clinical officer/ assistant medical officer (non-physician clinician)		(Chandler et al., 2009), (Duysburgh et al., 2013)
Township health worker	receive secondary school medical training (after 9 years of basic education) or junior college (after 12 years of basic education) in western or Chinese medicine, (are not specifically trained to conduct MCH services, they are responsible to perform PNC	(Chen et al., 2014)
Village doctors	attend technical school and receive training in western medicine (are not specifically trained to conduct MCH services, they are responsible to perform PNC	(Chen et al., 2014)
Health care workers	ANC, PMTCT, HIV/AIDS Service Provision Immunisations, maternal health services, emergency health services, preventive health care and communicable disease control.	(Conroy et al., 2015; Kabo et al., 2016), (Kambala et al., 2017), (Kols et al., 2015), (Manithip et al., 2013), (Peters et al., 2014), (Prytherch et al., 2012)
Health Extension worker	maternal and child health care: community outreach	(Gobezayehu et al., 2014), (Sibley et al., 2014), (Sotunsa et al., 2016)
Community health worker	minimum qualifications of reaching grade 7 and ability to read and write, provides basic community-based primary health care Community health worker (auxiliary nurse midwives, accredited social health activists, staff nurses)	(Mwanza et al., 2017), (Sotunsa et al., 2016) (Ramadurg et al., 2016)

Annex 8

Table (A3)

No.	Construct measured	Quantitative method	Quantitative tool	Tool reliable	Tool valid	Article
1.	Quality of care	Quantitative	Self-assessment tool	√	√	(Agha, 2010)
2.	Quality of care	Quantitative - Test	Test- A scoring system was devised for evaluating the understanding of plotting partograph for the case scenarios provided. The correct recording of foetal heart rate, cervical dilatation, uterine contractions and maternal condition on the partograph were given a score of two points each. The correct recording of the woman's identification data and interpretation of the findings was given a score of 1 point each, making a total of 10 points. A total score of 7 or more was considered to demonstrate an adequate understanding of the tool.			(Chandhiok et al., 2015)
3.	Quality of care	Quantitative - Survey	Maternal, New-born and child health household survey (coverage and quality of care) checking the new-born's umbilical cord; assessing the new-born's temperature; observation of and counselling for breastfeeding and counselling on new-born danger signs and weighing the baby. In addition, to checking the jaundice			(Chen et al., 2014)
4.	Quality of care	Quantitative - Survey	examined participants' experiences using an end line survey , and employed a pre- and post-test survey to assess changes in provider knowledge			(Diedhiou et al., 2015)
5.	Quality of care	Quantitative	Assess the effect of a multifaceted intervention to promote maternity death reviews and onsite training in emergency obstetric care in referral hospitals with high maternal mortality rates			(Dumont et al., 2013)
6.	Quality of care	Quantitative	National Standards of Quality of Care Assessment	X	X	(Nikiema et al., 2010)
7.	Quality of care + Compliance	Quantitative	Inventory of evidence-based practice on labour ward (based on WHO criteria 1996) Quality of care and compliance: labour and delivery: Admissions, routine care and observations	X	X	(Pitchforth et al., 2010)
8.	Quality + Knowledge+ Job Satisfaction	Quantitative	validated service provision assessment toolkit	X	√	(Rabbani et al., 2015)
9.	Knowledge	Quantitative	pre-test consisting of 23 questions based on the maternal healthcare guideline for rural healthcare facilities provided by the Ministry of Health of Paraguay (Calculating expected delivery date, components of the ANC program, measuring uterine fundus, assessing foetal presentation and position, recognizing signs of risk associated with pregnancy, delivery, and postpartum risks	X	√	(Ohnishi et al., 2007)
10.	Knowledge	Quantitative	clinical skills assessments and baseline/end line survey			(Sibley et al., 2014)
11.	Skills	Quantitative	Post skills test (immediately after training and 3 months later practical exam immediately upon completion of the course – the primary skills test – where their practical skills were assessed in a simulated resuscitation scenario using a neonatal manikin. Each candidate was given a score out of 10, based on successfully completing a series of steps in the resuscitation process. Candidates were then invited back for a reassessment 12 weeks after completion of the course, for the purpose of internal quality control. During this assessment, they were given the same scenario that was assessed in the first exam and the same marking criteria were used. In both assessments, candidates were examined by one of two instructors, either an experienced physician or an experienced paediatric nurse with specific neonatal training			(Conroy et al., 2015)
12.	Skills	Quantitative	semi-structured, self-administered skills and knowledge questionnaire	√	X	(Nyango et al., 2010)
13.	Knowledge + Skills	Quantitative	pre and post-tests (to evaluate the impact of a simulation-based training program on the abilities of SBA)			(Andreatta et al., 2011)

14.	Knowledge + Skills	Quantitative	standard HBB Knowledge (evaluate the effect of HBB training on neonatal resuscitation skills and knowledge, as well as retention of knowledge and skills) Check (pre and post MCQs) https://www.aap.org/en-us/Documents/hbs_hbb_knowledgecheck.pdf + BMV, OSCE A and OSCE B (skills) https://www.aap.org/en-us/Documents/hbs_hbb_bagmask_skillcheck.pdf	√	√	(Bang et al., 2016)
15.	Knowledge + Skills	Quantitative	pre-post evaluation of the I-CE course, with repeated measures to compare knowledge and self-reported practices at baseline (before the course), immediately after, and at four-months after completion of the course			(Canchihuaman et al., 2011)
16.	Knowledge + Skills	Quantitative	Knowledge and confidence were assessed using two pre- and post-training oral questionnaires : 26 items for knowledge and five items for confidence. Skills were assessed using three Objective Structured Clinical Examinations (OSCEs). The three OSCEs assessed prevention of postpartum haemorrhage, management of retained placenta, and management of severe haemorrhage from uterine atony. OSCEs were conducted using simulators immediately after training			(C. L. Evans et al., 2014)
17.	Knowledge + Skills	Quantitative	Pre/Post Course Knowledge Assessment	X	X	(Mirkuzie, Sisay, & Bedane, 2014)
18.	Knowledge + Skills	Quantitative	Knowledge Test and Skills Assessment	X	√	(Lakhani et al., 2016)
19.	Knowledge + Skills	Quantitative	Standard data collection tools	X	X	(Mirkuzie, Sisay, Reta, et al., 2014)No further info on tool
20.	Knowledge+ Skills + Self-efficacy	Quantitative	pre- post-test (written, performance, and self-efficacy evaluations focused on principles of resuscitation, initial steps, ventilation, and chest compressions			(Waldemar A. Carlo et al., 2009)
21.	Knowledge + self-efficacy	Quantitative	questionnaires about level of competency and knowledge related to pre-eclampsia	X	X	(Ramadurg et al., 2016)
22.	Knowledge + Self-efficacy	Quantitative	pre- and post-training assessments; questionnaire using scales of 0–100 based on Bandura's model of self-efficacy	X	X	(D. M. Walker et al., 2015)
23.	Knowledge+ Skills+ Performance	Quantitative	Pre-post written trainee knowledge, post training provider performance and skills, SB, pre-discharge mortality, and NMR before and after HBB training			(Goudar et al., 2013)
24.	Knowledge + Performance	Quantitative	knowledge questionnaire based on Averting Maternal Death and Disability model assessment forms 2 hypothetical scenarios for assessing decision making in EmONC care (eclampsia and new-born resuscitation); and the national midwifery education schools' tool to assess providers' EmONC skills using anatomic models	√	X	(Partamin et al., 2012)
25.	Knowledge + Self-confidence	Quantitative	self-administered structured questionnaire on recognition and management of IPV sufferers	√	√	(Jayatilleke et al., 2015)
26.	Knowledge + clinical confidence + Job Satisfaction, and on patients' receipt of services, perceived quality, and satisfaction	Quantitative	Obstetric knowledge test Job satisfaction questionnaire Clinical confidence questionnaire	X	X Check tool appendix	(M. E. Kruk et al., 2016)
27.	Competency	Quantitative	Midwifery Toolkit Tool : Midwife Self-assessment tool	X	√	(Kildea et al., 2012)
28.	Competency	Quantitative	Knowledge test	X	X	(Traoré et al., 2014)

29.	Performance	Quantitative	checklists , adapted and modified from the WHO,2002, 'New model ANC form' the 'ANC observation guide 'and the 'Guideline for health-care providers'- MOH,	X	X	(Manithip et al., 2013)
30.	Performance	Quantitative	Lot Quality Assurance (LQAS) survey questionnaire	X	X	(Mwanza et al., 2017)
31.	Self-efficacy	Quantitative	Resuscitation Self-Efficacy Scale	X	X	(Olson et al., 2015)
32.	Motivation	Quantitative	Health Worker Motivation Scale	√	√	(Prytherch et al., 2012)
33.	Job satisfaction	Quantitative	Minnesota Job Satisfaction Scale (adapted and translated to Turkish) which possesses characteristics revealing the internal and external satisfaction factors of the scale, is a 5-point Likert type scale, consisting of 20 clauses. The scores range between 1.0 and 5.0. Higher scores mean higher job satisfaction	√	√	(Cagan & Gunay, 2015)
34.	Job satisfaction	Quantitative	Self-administered structured questionnaires . Level of job satisfaction was measured with a multi item scales derived from Wellness Council of America and Best Companies Group . The job satisfaction questionnaire contained 36 items divided into eight main domains which include: leadership and planning, institutional culture and communication, employee's role, pay and benefit, work environment, training and development, relationship with supervisor and co-worker relationship. Each domain has satisfaction subsidiary scales which were measured by Likert scale			(Geleto et al., 2015)
35.	Job Satisfaction + Workplace Behaviour + organisational justice	Quantitative	Adapted Job Satisfaction Scale ; organisational citizenship behaviour scale developed by Podsakoff & McKenzie ; Niehoff & Moorman's justicescale	√	X	(McAuliffe et al., 2009)
36.	Organizational Citizenship Behaviour + Job Satisfaction + Occupational Stress	Quantitative	Podsakoff's OCB Questionnaire , Minnesota Satisfaction Scale , and Karasek's Job Content Questionnaire	√	√	(Sadodin et al., 2016)
37.	WORK-RELATED STRESS, BURNOUT AND JOB SATISFACTION	Quantitative	New tool made up of: WORK-RELATED STRESS, BURNOUT AND JOB SATISFACTION 10 questions to identify the respondents' perceptions of their work The 18-item Work-Related Strain Inventory (WRSI) The 20-item MWSQ The 22-item Malsach Burnout Inventory (MBI)			(Oncel et al., 2007)
38.	Patient satisfaction	Quantitative	structured questionnaire (first part asks sociodemographic information of mothers; 2nd part obstetric factors of the mother; 3rd part satisfaction of mothers was measured using 19 questions which were adopted from Donabedian quality assessment framework		√	(Bitew et al., 2015)
39.	Patient satisfaction	Quantitative	Perception of Quality of Care Tool	√	√	(Karim et al., 2015)
40.	Patient satisfaction	Quantitative	Structured Exit interview questionnaire	X	X	(Peters et al., 2014)
41.	Patient Satisfaction	Quantitative	Uludag scale for empathic communication expectations			(Tabak & Özmen, 2008)
42.	Burnout	Quantitative	Maslach Burnout Scale (The scale measures three components of burnout; emotional exhaustion (EE), depersonalization (D) and personal accomplishment (PA). High scores on the EE or DP subscales are indicative of burnout, as are low scores on the PS subscale	√	√	(Cagan & Gunay, 2015)
43.	Productivity	Quantitative	Self-completed anonymous questionnaires			(Forcheh & Fako, 2007)

No.	Construct measured	Mixed method	tool	Tool reliable	Tool valid	Articles
1.	Quality of care	Quantitative - Surveys	Quality of care was measured by: (i) health facility surveys , and (ii) reviews of patient records and maternal and child health registers at health facilities and districts			(Duysburgh et al., 2016)
		Qualitative- Observation and Interviews	(iii) direct observation studies, (iv) patient satisfaction surveys (exit interviews),			
2.	Quality of care	Quantitative - surveys	WHO guidelines on antenatal and childbirth care (i) health facility surveys , and (ii) document reviews of patients records and maternal and child health (MCH) registers at the health facilities and districts.			(Duysburgh et al., 2013)
		Qualitative- Observation and Interviews	(iii) direct observation studies, (iv) satisfaction surveys (exit interviews)			
3.	Quality of care	Quantitative	pre-tested structured questionnaire that was adopted from Population Council and USAID standards developed to measure the integration of family planning and other reproductive health services like antenatal care			(Ejigu et al., 2013)
		Qualitative	A semi-structured open-ended interview guide and observation checklists for observation of antenatal care service provisions and structural attributes were also used.			
4.	Quality of care	Mixed- Balance score cards	Score cards The Balanced Scorecard assessments included structured observation of the HF, interviews with 560 randomly selected health workers and observations and exit interviews with a random sample of 1468 patients.			(Engineer et al., 2016)
5.	Quality of care		data extraction			(Fakih et al., 2016)
		Qualitative- KII	Key informant interviews and observations (The health facility tools developed by the Averting Maternal Death and Disability program were adapted for local use).			
6.	Quality of care	Mixed- Observational checklist	Structured Observational Checklist (based on Focused ANC)			(Gross et al., 2011)
7.	Quality of care	Quantitative -	structured close-ended questionnaires	√	√	(Kambala et al., 2017)
		Qualitative-		X	X	
8.	Quality of care	Quantitative	Health Facility Checklist	X	X	(Nesbitt et al., 2013)
		Qualitative	and observed selected tracer items (based on AMDD)			
9.	Quality of care	Mixed Methods-adapted observational guides	two observational guides Tools influenced by: Averting Maternal Death and Disability Program and Jhpiego. Emergency obstetric care for doctors and midwives: Course handbook for trainers and participants. Available from: www.reproline.jhu.edu/english/2mnh/2obs_care/Assessment_Tools/Site_Assessment_Tools/03_Equip_SuppliesLaborBirth.pdf [Accessed July 23, 2009]. 36. Gill Z, Bailey P, Waxman R, Smith JB. A tool for assessing 'readiness' in emergency obstetric care: The room-by-room 'walk-through.' Int J Gynecol Obstet 2005;89:191-9.			(Vivio et al., 2010)
10	Quality of care	Mixed method- Quantitative	structured questionnaire Quality of care: providers' counselling of pregnancy danger signs			(Pembe et al., 2010)
		Qualitative	Client-provider observation checklist and exit interview - re-tested			

11	Knowledge	Quantitative	knowledge questionnaire based on model assessment forms in the Needs Assessment Toolkit	√		(Young Mi Kim, Nasratullah Ansari, Adrienne Kols, Hannah Tappis, Sheena Currie, Partamin Zainullah, Patricia Bailey, Richard Semba, et al., 2013)
		Qualitative	39-item skills checklist developed by Afghan midwifery schools to assess providers' performance during clinical simulation	√		
12	Knowledge + Skills	Quantitative	Checklist (observed the providers perform MVA on an anatomical model and recorded their skills on a nine-part observation checklist)			(Ansari, Zainullah, Kim, Tappis, Kols, Currie, Haver, van Roosmalen, Broerse, Stekelenburg, et al., 2015)
		Qualitative	Provider Interview To investigate providers' proficiency in provision of high-quality PAC, assessors first interviewed all selected providers with three open-ended questions to identify the most common complications of unsafe or incomplete abortion (4 items), steps to take in examining and managing women with complications of unsafe or incomplete abortion (9 items), and information that should be provided to all women treated for incomplete or unsafe abortions (7 items)			
13	Knowledge and Skills	Quantitative	Pre and Post-test- Scoring method (Participants were asked to demonstrate the steps for Prevent Problems Before Baby Is Born and Prevent Problems After Baby Is Born. Each care step was scored either one (1) (correctly completed the step in full) or zero (0) (omitted or completed the step partially/incorrectly)			(Gobezayehu et al., 2014)
		Qualitative	Observational checklist (The skills checklist is the principal assessment instrument developed based on the content of the training and contains the same steps as the pictorial Take Action Cards. There are 14 steps for Prevent Problems Before Baby Is Born (care during labour and birth) and 16 steps for Prevent Problems After Baby Is Born (care immediately after birth))			
14	Knowledge + Skills	Quantitative	Pre and post-test Participants' knowledge and skills were assessed before (pre-test) and after the 3-day training (post-test). Knowledge was assessed using 40 multiple-choice questions (True or False) covering eight key topics: (1) Airway, breathing and circulation (ABC) and maternal and new-born resuscitation; (2) shock and the unconscious patient; (3) eclampsia and severe pre-eclampsia; (4) communication and triage; (5) obstetric emergencies; (6) haemorrhage; (7) obstructed labour; (8) sepsis and abortion complications. The maximum score for each section was 5.0. All questionnaires were anonymous. A series of eight standardised skills tests were designed corresponding to key topics. A minimum of two participants for each module and for each training session were selected randomly to participate in a skills test. Each participant repeated the same skills test before and after the training. During the skills test, the participant was alone with a facilitator who assessed the skills according to pre-specified scoring guidelines for skills and analytical thinking, leading to appropriate decision-making.			(Grady et al., 2011)
		Qualitative	verbal feedback was received using small group discussion and the opportunity for providing anonymous written responses			

15	Knowledge + Competency	Quantitative	Case Scenario Instrument	√	X	(Young Mi Kim, Nasratullah Ansari, Adrienne Kols, Hannah Tappis, Sheena Currie, Partamin Zainullah, Patricia Bailey, Jos van Roosmalen, et al., 2013) Tool not retrievable
		Qualitative	Capacity Assessment based on model assessment forms in the Needs Assessment Toolkit	√	X	
16	Knowledge + Competency	Quantitative	self-administered knowledge questionnaire	X	X	(Sheikh et al., 2016)
		Qualitative	FGDs and KIs about PE&E knowledge	X	X	
17	Knowledge + Practice	Quantitative	pre/post-training knowledge tests	X	X	(Ratcliffe et al., 2016)
		Qualitative	Direct observations	X	X	
18	Competency (cultural)	Quantitative	Structured Questionnaire with some modification of Campinha Bacote's tool (http://transculturalcare.net/iapcc-r/)			(Aragaw et al., 2015)
		Qualitative	semi structured guide			
19	Competency	Quantitative	competency assessment tool for obstetric rooming-in ward nurses	√	√	(Zhang et al., 2015)
		Qualitative	interviews			
20	Compliance	Quantitative	assessment and monitoring tool : record reviews	√		(Kabo et al., 2016)
		Qualitative	observations of client–provider interactions, structured interviews and direct observations	√		
21	Performance + working conditions	Quantitative	Work Environment Structured Questionnaire			(Y. M. Kim et al., 2013)
		Qualitative	SMB-R Observation Checklist			
22	Motivation	Quantitative	Motivation questionnaire : 2 main parts: 'internal' and 'environmental', using 37 items from Penn-Kekana et al.'s (2005) study and 15 of the more consistent item statements from Bennett et al.'s (2001) tool, together with 10 items developed from the results of the qualitative study			(Chandler et al., 2009)
		Qualitative	Qualitative			
23	Motivation	Quantitative	Motivation tool	√	√	(Morrison et al., 2015)
		Qualitative	How is motivation defined in Nepal: Qualitative study (no further mention of tool in article)		√	
24	Motivation	Quantitative	23-item motivation scale developed by Mbindyo, translated to Vietnamese	√	√	(Thu et al., 2015)
		Qualitative				
25	Patient satisfaction	Quantitative	Disrespectful and abusive treatment facility and community survey	X	X	(Kujawski et al., 2015)
		Qualitative	Quality of Care interview	X	X	

No.	Construct measured	Qualitative method	tool	Tool reliable	Tool valid	Articles
1.	Quality of care	Observation stimulated patient	Observed simulated patient: assesses the providers' capacity to test, diagnose, and then treat paediatric malaria			(Aung et al., 2015)
2.	Quality of care	Observational checklist	structured clinical observation checklists (routine care process indicators grouped into three categories based on their main function in addressing risk factors of maternal or neonatal complications (quality of care indicators assessing clinical care)			(Brenner et al., 2015)
3.	Quality of care	Observational checklist	SBM-R Observation Checklist: ANC, PMTCT, HIV/AIDS Service Provision			(Young Mi Kim, Maureen Chilila, et al., 2013)
4.	Quality of care	observation checklist	client-provider interactions observation checklist			(Warren et al., 2010)
5.	Quality of care	Observational checklist	structured observation of labour			(D. Walker et al., 2012b)
6.	Quality of care	Observational checklist	Observation checklist; general prenatal care, birth preparedness, dangers signs, clean delivery, and new-born care	X	X	(Jennings et al., 2010)
7.	Quality + Skills	Observational checklist	Observation checklist: of non-emergency delivery practices			(Walton et al., 2016)
8.	Quality + Patient satisfaction	Observation checklists; structured exit-interviews	Observation checklists; structured exit-interviews			(Tetui et al., 2012)
9.	Knowledge	Semi-Structure interview	semi structured interview guide (Knowledge on mitigate intergenerational violence by identifying and making the appropriate referrals for pregnant women who are victims of gender-based violence (GBV)			(Pitter, 2016b)
10.	Knowledge + Skills	FGDs and IDIs	FGDs and IDIs	X	√	(Sotunsa et al., 2016)
11.	Competency	case vignettes	written case vignettes (Their competency at (a) initial assessment, (b) diagnosis, and (c) making decisions on appropriate first-line care for these complications was scored		√	(Chaturvedi et al., 2014)
12.	Compliance	Observational checklist	Systematic observation using a pre-defined check list was used to assess health workers' compliance with focused ANC procedures and infrastructure of the HF			(Conrad et al., 2012)
13.	Performance	Observational checklist	checklist of observing the measurement of training performance	√	√	(Saber et al., 2016)
14.	Performance + working condition	Observational checklist	SBM-R Observation Checklist; Work Environment Provider Interview Tool developed for Kenya's emergency hiring plan			(Kols et al., 2015)
15.	Patient satisfaction	Interview + Checklist	an interviewer -administered questionnaire (satisfaction); checklist for Assessment of Clinical Breast Examination			(Vithana et al., 2013)

Annex 9

Initial Performance Tool Arabic Version

1. ماذا تفعلين اثناء زيارة كشف الحوامل
 قياس ضغط الدم
 فحص الهيموغلوبين
 فحص البول
2. هل تقومي بوضع خطة للولادة مع السيدة الحامل؟ نعم لا (في حالة الاجابة بلا اذهب للسؤال 4)
3. كيف تقومي بوضع خطة للولادة , اشرحي؟
 شرح لماذا تكون الولادة في المرفق الصحي مطلوبة (لتجنب حدوث مضاعفات أثناء الولادة ، و لوجود كل التسهيلات في المرفق الصحي مع إمكانية التحويل إلى مرفق صحي آخر إذا لزم الأمر)
 شرح كيفية الوصول لمركز الخدمة .
 قدر تكلفة المواصلات للوصول لمركز الخدمة .
 تحديد احد أفراد الأسرة ليقوم بمرافقة الأم و مساعدتها و مساندتها أثناء الولادة و اخر لرعاية ابناءها بالمنزل.
 من الذى يقوم برعاية أطفالها بالمنزل .
 أرشد الأم بأن تحضر معها فوط نظيفة لغسل و تجفيف و تغطية الطفل .
 إحضار فوط نظيفة إضافية تستعمل كوسادة مهبلية بعد الولادة .
 إحضار ملابس للأم و الطفل .
 إحضار أطعمة و مشروبات و شخص للمساندة و الدعم .
4. ما هي الحالات ذات الخطورة العالية اثناء الحمل؟
 صغر او كبير السن
 متعددة الولادات (اكثر من 4)
 حامل بتوام او اكثر
 تاريخ ولادة متعثر
5. ما هي الحالات التي تستدعي الولادة

ا- بالمستشفى

- ولادات قيصرية سابقة
 - عمر الام اقل من 14 سنة
 - وضع الجنين غير طبيعي (بعد الاسبوع 32)
 - متكررة ولادة
 - تمزق في عنق الرحم من الدرجة الثالثة موثق في سجل الام الحامل
 - تاريخ نزف مهبلى او وجود نزف مهبلى في الوقت الحالى
- ب- بالمركز الصحي:

- الولادة الاولى للام
- اخر مولود ولد ميتا او مات في اليوم الاول
- عمر الام الحامل اقل من 16 سنة
- متكررة ولادة (اكثر من 6 ولادات)

- ولادة سابقة مصحوبة :
- نزيف حاد
- تشنجات
- بواسطة جفت او شفت

6. ما هي علامات الخطورة عند الولادة؟
- النزيف
 - الارتجاج
 - الحمى

7. ما هي الحالات التي تستدعي التحويل الفوري للمستشفى بعد الولادة ؟
- نزف مهبلي ابتدائي غزير نتيجة عدم تكور الرحم - نزف من قناة الولادة نتيجة تمزق قناة الولادة - نزف من الوربية او من الجرح الناتج عن ازالة الختان)
 - حالة الصدمة (التعرق- زيادة نبض القلب- برودة الاطراف- تاثر درجة الوعي - زغلة في العين)
 - ارتفاع ضغط الدم
 - الارتجاج (التشنجات)
 - ألم شديد في البطن

8. ماهي عدد الزيارات ما بعد الولادة و اثناء فترة النفاس؟
- 4 زيارات اجابة صحيحة
 - خلاف 4 زيارات اجابة غير صحيحة

9. و بتقومي بشنوفي هذه الزيارات؟

ا- فحص الام:

- المظهر العام
- العلامات الحيوية (ضغط الدم ، النبض والحرارة)
- مفرزات النفاس
- فحص الرحم
- فحص الأعضاء التناسلية الخارجية

ب- الطفل

- عدم قدرة الطفل على الرضاعة
- التشنجات
- درجة حرارة الطفل <37.5 و >35.5
- انتفاخ اليافوخ
- قلة او عدم الحركة

10. كيف تقومين بمشورة

ا- الام

- النظافة الشخصية
- تغذية الام
- فيتامين ي
- فوليك اسد
- تنظيم الاسرة

ب- الطفل

- الرضاعة الطبيعية
- تطعيم الطفل

11. ما هي الحالات التي تستدعي التحويل في اقرب فرصة أثناء النفاس؟
- نزف مهبلي ثانوي غزير نتيجة لالتهاب اغشية الرحم
 - افرازات ذات رائحة كريهة ولون متغير (اخضر -اصفر مخضر)
 - التهاب جرح الوربة
 - حمى (حمى النفاس باسبابها)

12. ما هي أنواع وسائل المباحة بين الولادات؟
- طبيعي
 - حبوب مرضعات (احادية الهرمون)
 - حبوب (ثنائية الهرمون)
 - الواقي الذكري
 - غرسات
 - لولب

13. حزمة الرعاية الصحية الاولية فيها شنو؟
- صحة الانجابية
 - صحة الطفل
 - التحصين
 - التغذية
 - الادوية الاساسية

الالتزام بمعايير الاداء

14. هل حولتي حالة؟ نعم لا (في حلة الاجابة بلا اذهب السؤال 16)

ا- ان كانت الاجابة بنعم ما هي الحالة التي استدعت التحويل :

- نزف مهبلي ابتدائي غزير نتيجة عدم تكور الرحم - نزف من قناة الولادة نتيجة تمزق قناة الولادة - نزف من الوربة او من الجرح الناتج عن ازالة الختان)
- حالة الصدمة (التعرق- زيادة نبض القلب- برودة الاطراف- تاثر درجة الوعي - زغلة في العين)
- ارتفاع ضغط الدم
- الارتعاج (التشنجات)
- ألم شديد في البطن

ب- مكان التحويل

- مركز صحي
- مستشفى
- اخرى

- ت- هل كان المكان المناسب للتحويل نعم لا

15. هل يوجد دفتر تسجيل نعم لا (في حلة الاجابة بلا اذهب السؤال 17)

16. اي من الاتي موجود في دفتر القابلة المجتمعية :

- تردد المستفيدات
- تسجيل الحوامل (حبوب الحديد وال فوليك أسيد).

- الولادات
- زيارات النفاس
- التحويل (الحمل - الولادة - النفاس)
- تنظيم الأسرة (حبوب - وافي ذكري)
- الوفيات الامهات والاطفال / سبب الوفي / تاريخ الوفي
- مرتبطة بالمركز الصحي

17. كيف تتم معالجة حالات الطوارئ اثناء الولادة؟

- التحويل (الاجابة الصحيحة)
- غير التحويل (الاجابة الخاطئة)

18. هل حولتي قبل كدة حالة؟ نعم لا

19. هل تقدم لهم المشورة بخصوص التباعد بين الحمل: نعم لا

20. ما هي الانشطة الاخرى التي تقومين بها في المجتمع؟

- توزيع الناموسيات
- تقديم محاضرات توعوية
- حملات التطعيم

الكفاية

جدا	جيد	محايد	ضعيف	ضعيف جدا	ما هي مدى مهارة القابلة المجتمعية في القيام ب:
5	4	3	2	1	20- غسل الايدي
5	4	3	2	1	21- لبس الجونتيات
5	4	3	2	1	22- القيام بتعقيم المعدات
5	4	3	2	1	23. كيفية انعاش الوليدي *
5	4	3	2	1	24. كيفية تهوية المولود**
5	4	3	2	1	25. معرفة الناقص من شنطة الولادة. maternal kit ***
5	4	3	2	1	26. قياس العلامات الحيوية (النبض , الحرارة , ضغط الدم)

الرضا الوظيفي

راضية جدا	راضية	محايد	غير راضية	غير راضية ابدا	لا	نعم	
5	4	3	2	1			1. العمل في وظيفة حكومية
5	4	3	2	1			2. حافظ ثابت من الحكومة
5	4	3	2	1			3. مساعدة من المجتمع
5	4	3	2	1			4. دعم اي كان نوعه (مادي/ مشاريع)
5	4	3	2	1			5. دعم من العدة او الشيخ
5	4	3	2	1			6. دعم من المجتمع المحلي
5	4	3	2	1			7. إشراكك في كل القضايا المتعلقة بالمرأة في المنطقة
5	4	3	2	1			8. دورات التدريبية
5	4	3	2	1			9. فرص للتطور المهني
5	4	3	2	1			10. توفر كل معينات العمل
5	4	3	2	1			11. توفر معينات عمل صالحة للاستعمال
5	4	3	2	1			12. وجود الماء و الكهرباء
5	4	3	2	1			13. وجود الادوية الاساسية
5	4	3	2	1			14. معدل التحديات البواجها في الوظيفة
5	4	3	2	1			15. معدل الامان البتوفرو الوظيفة
5	4	3	2	1			16. عموما انا راضية بوظيفتي
5	4	3	2	1			17. فرصة استعمال مهاراتي في العمل
5	4	3	2	1			18. انو يقوم بعمل مهم

الاشراف المحسوس/ الملموس

راضية جدا	راضية	محايد	غير راضية	غير راضية ابدا	
5	4	3	2	1	19. يلتقي بالمشرف بشكل منتظم
5	4	3	2	1	20. مشرفتي تقدرني
5	4	3	2	1	21. مشرفتي تلتقيني بانتظام لمناقشة المشاكل و الحلول
5	4	3	2	1	22. مشرفتي تاخذ بعين الاعتبار وجهة نظري و افكاري
5	4	3	2	1	23. مشرفتي تجد فن التواصل
5	4	3	2	1	24. يساعدني المشرف على تحديث معرفتي

الدافع

جيد جدا	جيد	محايد	ضعيف	ضعيف جدا	انا يقوم بعملى كقابلية مجتمعية:
5	4	3	2	1	1. حتى اكون محبوبه
5	4	3	2	1	2. حتى لا احس بانى شريرة
5	4	3	2	1	3. حتى لا اغضب الاخرين ان لم افعل
5	4	3	2	1	4. لاني افكر مهم ان افعل هذا
5	4	3	2	1	5. لاني احب ان افعل هذا
5	4	3	2	1	6. لاني شعرت انى مضطرة
5	4	3	2	1	7. لاني شعرت انه واجبى
5	4	3	2	1	8. لاني مقببة فعل ذلك
5	4	3	2	1	9. لاني مهتمة بالآخرين
5	4	3	2	1	10. لاني ظننت انى ساستمتع
5	4	3	2	1	11. لاني مقدره ان مساعدتى مفيدة

*عدم التنفس أو اللهاث:

- جفف الطفل ، وتغويه الطفل بتياب جافه دافنه .
- أنقل الطفل الى سطح ثابت دافئ تحت سخان مشع لأنعاشه اذا كان متوفراً .
- الالتزام بالممارسات السليمه لمنع العدوى أثناء التعامل مع المولود .

فتح المسلك الهوائى.

- وضعية الوليد :ضع الطفل على ظهره .
- وضع لفافه من القماش تحت كتفى الطفل ضع الرأس فى وضعية بسط خفيفه لفتح المسلك الهوائى.
- حافظ على الطفل مغطى ، ماعدا الوجه وأعلى الصدر (لابد من تغطية الرأس) .
- نظف المسلك الهوائى بشفت الفم أولاً ثم الانف .

**تهويه المولود :

- تأكد من وضعيه المولود . يجب أن يكون العنق منبسطاً قليلاً .
- (على وجه المولود يجب أن يغطى الذقن والفم والانف mask وضع القناع (كمامة /
- تأكد أن المنطقة بين القناع والوجه محكمة القفل (مشدودة تماماً حتى لايتسرب الهواء بواسطة راحة كفة يدك) .
- أعصر الكيس باصبعين فقط أو بكامل اليد حسب حجم الكيس .
- أفحص المنطقة بين الكمامه والوجه للتأكد بأنها مشدوة بالكامل وراقب ارتفاع الصدر .
- عندما تضمن أن حركه الصدر موجوده ولايوجد تسرب للهواء : قم بتهويه المولود بمعدل 40 تنفساً فى الدقيقة لاتضغط بعنف على الكيس .

- اذا كان صدر الطفل يرتفع ، يكون ضغط التهويه كافى

*** محتويات شنطة القلبلة

Annex 10

Final Performance Tool and Scoring Guide

Q No.	Question	Range of Scores= each question scores a total of 1
Q1	How many ANC visits are there?	K1=1
Q2	What are the high-risk pregnancy cases that require institutional delivery?	K 2= A high score of = 12 to be created as a %=1
	Age of mother < 14 AND >35 YEARS	
	Multipara (>6 deliveries)	
	Multiple pregnancy (twins, triplets)	
	Eventful previous delivery accompanied by extensive haemorrhage	
	Hospital: Previous caesarean section	
	Mal presentation of foetus (after 32 weeks)	
	Bad obstetrical history	
	Documented History of uterine tear from third stage of labour	
	PHC level: Primigravida	
	Last delivery was still birth or died within the first day	
	Eventful previous delivery accompanied by convulsions	
Eventful previous delivery accompanied by assisted by forceps or vacuum		
Q3	Which cases require immediate referral after labour?	K3 = A high score of= 5 to be created as a %=1
	Extensive vaginal bleeding	
	Shock	
	High blood pressure	
	Eclampsia	
Severe abdominal pain		
Q 4	What do you do in the PNC visit?	K4= A high score of= 11 to be created as a %=1
	a- Inspect the Mother: general appearance vital signs	

	puerperium discharge	
	examine uterus	
	Examine wound/ external genitalia	
	c- Inspect Baby: Vital signs	
	Ability to defecate/ urinate	
	Umbilical cord	
	Ability to breast feed	
	Movement	
	Colour/ Jaundice	
Q 5	How do you counsel for postnatal care for the mother and baby?	K 5= A high score of =8. to be created as a %=1
	A- Mother: Personal Hygiene	
	Mother's nutrition	
	Mobility/ movement	
	Mother's supplements Vitamin E	
	Mother's supplements fefol	
	Family planning	
	B- Baby: Natural breast feeding	
	Immunisation	
Q 6	What are family planning methods? Natural	K6= A high score of= 7 to be created as a %=1
	Mini-Pill	
	Combined Pills	
	Injection	
	Male Condom	
	Implant	
	IUD	

Q No.	Question: How well does the CMW demonstrate:	Very Poor	Poor	Fair	Good	Very Good	Range of Score <3 =0 >=3=1
Q 7	How they wash their hands?	1	2	3	4	5	
Q 8	How they wear gloves and take them off?	1	2	3	4	5	
Q 9	Knows what's missing from her Maternal Kit?	1	2	3	4	5	
Q 10	Measure vital signs (BP, PR, Temp)	1	2	3	4	5	

Hand wash:

1. The CMW scored one if she applied the soap bar to a cupped hand and lathered well
2. She scored an additional point for rubbing her hand palm to palm with the right palm over left dorsum with interlaced fingers and vice-versa
3. If she rotationally rubbed, her left thumb clasped in right palm, and vice versa, she was given an additional point
4. Additional points were given if she rotationally rubbed backward and forwards with clasped fingers of the right hand in left palm and vice versa
5. A final point was given if she rinsed her hands with water and dried them thoroughly. The CMW was given an extra score of =1 for each of the following steps, a total of 5 maximum points.

Wear and Removal of gloves: with each step earning a score of one point, for a maximum of five points.

1. Removing all her jewellery and hand inspection for sores and abrasions and ensuring sleeves were rolled up to the elbows (1 point)
2. An additional point was scored if she picked up the glove with the dominant hand by touching the inside cuff of the glove and did not touch the outside of the glove, while pulling the glove completely over her dominant hand.
3. A third point was given if she inserted the gloved hand into the cuff of the remaining glove and pulled the remaining glove on the non-dominant hand, inserting her fingers while adjusting and keeping hands interlocked, away from clothing and above her waist and below her shoulders.
4. Additional points were also allocated wherein the removal of gloves, the CMW grasped the outside of the cuff or palm of the glove and gently pulled the glove off, turning it inside out and placing it into the gloved hand.
5. She scored a final point when she took the ungloved hand, placed her fingers on the other glove, and pulled the glove off inside-out.

Midwifery kit:

1. essential drugs (e.g., oxytocin)
2. renewable medical supplies (e.g., scissors)
3. medical equipment (e.g., syringes)
4. essential sterilisation, and
5. resuscitation equipment.

Vital signs:

1. Body temperature
2. Heart rate
3. Blood pressure

CMW measuring two of the three vital signs was assessed, including body temperature, heart rate, and blood pressure. Each CMW was scored a full 2.5 marks if she accurately took the vital sign and gave the right reading. Any failure led to the loss of part of the mark

Job Satisfaction

Q No.	Question	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Q1	Working for the government	1	2	3	4	5
Q2	Incentives from the government	1	2	3	4	5
Q3	Availability of equipment and supplies	1	2	3	4	5
Q4	Availability of water and electricity needed for my work	1	2	3	4	5
Q5	Availability of drugs for my patients	1	2	3	4	5
Q6	The amount of challenge in my job	1	2	3	4	5
Q7	The amount of job security I have	1	2	3	4	5

Perceived Supervision

Q No.	Question	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Q 1	My supervisor meets with me regularly	1	2	3	4	5
Q 2	My supervisor meets with me regularly to discuss problems and solutions	1	2	3	4	5
Q 3	My supervisor takes into consideration my views and ideas	1	2	3	4	5
Q4	My supervisor appreciates me	1	2	3	4	5
Q 5	My supervisor helps me to update my knowledge	1	2	3	4	5

Motivation at work

Q No.	Question: I work as a community midwife:	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Q1	Because I like acting this way	1	2	3	4	5

Q2	Because I feel I should	1	2	3	4	5
Q3	Because I enjoy it	1	2	3	4	5
Q4	Because I care about the women in my community	1	2	3	4	5
Q5	Because I feel I have to	1	2	3	4	5
Q6	Because I value doing so	1	2	3	4	5
Q7	Because I would feel like a bad person if I didn't	1	2	3	4	5
Q8	Because I appreciate that my help could be useful	1	2	3	4	5

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