# EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE

by

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# DECLARATION

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**EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**

I declare that the above thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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SIGNATURE

DATE 25 FEBRUARY 2021

## DEDICATION

*This study is dedicated to*

*Makgalema Moloko, my husband, for his patience, love, support and motivation. Without you, I would not have been able to achieve this.*

*Tshwane District and the City of Tshwane Metropolitan Municipality health department for the support*

*All facilities and staff for dedicated health care service provision*

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**EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**


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## ABSTRACT


The Routine Health Information System (RHIS) in South Africa utilises the District Health Information System (DHIS) to manage reproductive health programme data. The reproductive health programme requires an RHIS that is capable of generating quality data that will be used for decision-making. The study intended to evaluate the performance of the RHIS using DHIS in generating quality reproductive health information in the Tshwane district.

The study was conducted in 13 facilities in the City of Tshwane. A sequential explanatory mixed-method design was employed to evaluate the performance of the RHIS in generating quality reproductive health information. A Delphi technique was then used to develop strategies to improve the management of reproductive health data. The stratified random, purposive critical case and purposive sampling were used to select health care providers (HCPs), facility managers and experts, respectively. Data were collected from HCPs, facility managers and experts through questionnaires, in-depth interviews, and the modified Delphi technique, respectively. Quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) program for Windows, and thematic analysis was employed for the qualitative data.

The majority of HCPs were not trained on the RHIS. Data generated from the system was therefore of poor quality. Managers played a critical role in managing reproductive health information by ensuring the generation of high-quality data. Reproductive health

information was used in managing the facility and improving the service, however the culture of information use was suboptimal. Several challenges related to behavioural (HCPs' competence, confidence, interest and commitment), technical (complex design of data collection tool), and organisational (training, resources, supportive supervision and information culture) factors affected data quality and the use of information negatively. The reproductive health programme was not performing well due to a lack of skills for inserting intrauterine contraceptive devices, patients' preference for short-acting reversable contraceptive (SARC) methods, and the use of private practitioners who failed to report reproductive services on the RHIS. The performance of the RHIS was below expectation because of the suboptimal level of data quality and use of information. Strategies were developed to address the factors affecting the data management process, with the aim of improving the performance of the RHIS in managing reproductive health information.

**Key concepts**

Data quality; District Health Information System; experts; facility managers; health care providers; experts, reproductive health; Routine Health Information System; use of information

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| | |
|---|---|
| CYPR | Couple Year Protection Rate |
| DHIS | District Health Information System |
| DHIS2 | District Health Information System2 (web-based DHIS) |
| DHMIS | District Health Management Information System |
| HISP-SA | Health Information System Program South Africa |
| EFA | Exploratory Factor Analysis |
| HCP | Health Care Provider |
| HISP | Health Information System Program |
| HMIS | Health Management Information System |
| HIMS | Health Information Management System |
| HIM | Health Information Management |
| HRD | Human Resource Development |
| IUCD | Intrauterine contraceptive device |
| KMO | Keiser-Meyer-Olkin |
| KRA | Key Results Areas |
| LARC | Long-Acting Reversible Contraceptive |
| MDS | Minimum Data Set |
| MSA | Measure of Sampling Adequacy |
| NDoH | National Department of Health |
| NGOs | Non-Governmental Organisations |
| NIDS | National Indicator Data Sets |
| PIDS | Provincial Indicator Sets |
| PRISM | Performance of Routine Information System Management |
| RDQA | Routine data quality assessment |
| RHI | Routine Health Information |
| RHIS | Routine Health Information System |
| SARC | Short-Acting Reversible Contraceptive |
| SDGs | Sustainable Development Goals |
| SOP | Standard Operating Procedure |
| Stats SA | Statistic South Africa |
| SWOT | Strength, Weakness, Opportunities and Threat |

| | |
|---|---|
| USB | Universal Serial Bus |
| USAID | United States Agency for International Development |
| WHO | World Health Organization |

# CHAPTER 1
# OVERVIEW OF THE STUDY

## 1.1 INTRODUCTION

The World Health Organization (WHO) identified the health information system as a significant building block of any health system (Cheburet & Odhiambi-Otieno 2016a:201; Seitio-Kgokgwe Mashalla, Seloilwe & Chida 2016:1). The health information system incorporates data collection, processing, dissemination, and the use of information to support evidence-based decision-making at all levels of the healthcare system (USAID & MEASURE Evaluation 2017:8). The health information system includes both routine and non-routine health data, where non-routine data relate to population censuses and surveys undertaken at an interval of more than one year (USAID & MEASURE Evaluation 2018a:8). A routine health information system (RHIS) generates data on a routine basis, which is monthly, quarterly, bi-annually and annually (USAID & MEASURE Evaluation 2018a:8). RHIS is utilised internationally by several Asian and African countries, including Pakistan, Botswana and South Africa, to collect, analyse and present routine health data (Anwar, Rizvi, Khan & Kumar 2015:3; Seitio-Kgokgwe et al 2016:2; Wagenaar, Sherr, Fernandes & Wagenaar 2015:2; Wright, Mahony & Cilliers 2017:54; USAID and MEASURE 2018a:7). The information generated from the RHIS is not only used in monitoring health programmes' performance and financial expenditures, but also for day-to-day patient care, disease prioritisation, health education and resource allocation (Dagnew, Woreta and Shiferaw, 2018:2; Zweigenthal, Puoane, Reynolds, London, Coetzee, Alperstein et al 2017:224). The information is also used to develop plans and budgets for improving the effectiveness and efficiency of the health care services (Shiferaw, Zegeye, Assefa & Yanit 2017:2).

The improvement of health services is essential for the accomplishment of the Sustainable Development Goals (SDGs), particularly SDG number 3, which aims to ensure healthy lives and promote wellbeing for all at all ages (Ohiri, Ukoha, Nwangwu, Chima, Ogundeji, Rone & Reich 2016:319; Osborn, Cutter & Ullah 2015:13). Therefore, all United Nations countries are expected to achieve universal access to

sexual and reproductive health service, including family planning, information and education, and integrate reproductive health into national strategies and programmes by 2030 (Osborn et al 2015:13). The achievement of the SDGs targets relies in the effectiveness and efficiency of the health information system. An effective and efficient health information system is one that generates high-quality data that is analysed, and the information is disseminated on time to support the effective planning and management of services (Seitio-Kgokgwe et al 2016:1).

Unfortunately, it was recognised that the health information system in many low-income countries has not been generating useful and reliable information. Poor data quality has been identified as the primary contributing factor to unreliable information; data are often incomplete and inaccurate (Kabakama, Ngallaba, Musto, Montesanti, Konje & Kishamada 2016:85; Massyn, Peer, Padarath, Barron & Day 2015:143). Consequently, the information is left in reports, shelves and databases without being utilised in policy development, programme improvement and strategic planning (Dagnew et al 2018:2; Mucee, Odhiambo-Otieno, Kaburi & Kinyamu 2016:661).

## 1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

South Africa consists of nine provinces, 52 districts, and 11 official languages. It is diverse in ethnic groups, social values, socioeconomic status, population density, disease burden, and health outcomes (Day 2019:1). Health services are delivered at three levels of government, namely the national, provincial and district level, resulting in the need to have well-functioning monitoring and evaluation systems facilitating health status and service reporting at all levels (NDoH 2012a:10). To fulfil the monitoring and evaluation role, the National Department of Health was mandated to "facilitate and coordinate the establishment, implementation and maintenance by provincial departments, district health councils, municipalities and the private health sector of health information systems at national & provincial and local levels in order to create a comprehensive national health information system" (NDoH 2011:9; Republic of South Africa 2003).

Accordingly, the health information system is the primary monitoring system expected to produce relevant and reliable information that stakeholders can utilise in making

evidence-based decisions regarding health system interventions (NDoH 2011:11; Day 2019:1). It is a “system that integrates data collection, processing, reporting, use of information necessary for improving health service effectiveness and efficiency through better management at all levels of health services” (NDoH 2011:10). South Africa adopted the first national minimum data set in 1999, which was rolled out to all public primary health care facilities. Later, it was expanded to cover hospitals, emergency medical services, environmental health services and others (NDoH 2011:11). Consequently, District Health Information System (DHIS) software was developed and adopted as the national standard system for capturing, storing, analysing and reporting on routine data (NDoH 2011:11). The aim was to enable districts to assess whether goals, objectives, indicators and targets, based on both strategic and operational plans, were being achieved.

Health care providers’ (HCPs) role is to collect health data daily using a hard copy data collection tool, called the minimum data set (MDS) tool. With this tool, information is reported by ticking the relevant data element for the service rendered (NDoH 2012a:8; Wrigh et al 2017:54). The HCPs are expected to have data element definitions in their service areas for clarification, ensure clarity on the meaning of the elements, and verify the data before they are captured into the system. On a daily or weekly basis, the data are captured into an Excel electronic sheet (Wright et al 2017:54). At the end of every month, the facility manager conducts data quality checks and data validation, then submits reports to the sub-district or district level through the area manager (Wright et al 2017:54).

The data are sent through electronic mail, compact disc or universal serial bus (USB) flash drive and exported into the DHIS software where it is further validated and analysed against indicators (NDoH 2012a:8). The district office is expected to send monthly feedback to the facilities, reflecting all data elements and indicators’ performance for the specific facility. All HCPs are expected to utilise feedback to improve service provision.

The couple year protection rate (CYPR) is an indicator used to measure the performance of the reproductive programme. South Africa adopted the WHO formula to calculate the CYPR, as recommended by USAID, because it was easy to calculate

from routinely collected data (Massyn, Barron, Day, Ndlovu & Padarath 2020:66; NDoH 2012b:84). Different data elements are used to calculate the CYPR, which assesses contraceptive use and the rate at which couples are protected from unwanted pregnancies. The numerator consists of all contraceptive methods issued or inserted, and sterilisations performed on men and women. The numerator is based on the estimation of the extent to which the couple is protected from pregnancy if only one method is used. This is done by adjusting each contraceptive method by a factor or a number to convert it into a contraceptive year. For example, each Medroxyprogesterone injection is divided by the number “4” to be equivalent to 0.25 contraceptive years. The denominator is the female population aged 15 to 45 years, and is used as a proxy for couples (Health Information System Program (HISP) [sa]:23; Massyn, Padarath, Peer & Day 2017:130; Massyn et al 2020:66).

The population data are sourced from Statistic South Africa, based on the last census that was conducted. Moreover, the DHIS software conducts annual population estimates based on expected population growth, while the numerator is sourced from the reproductive data collected daily by HCPs (HISP [sa]:30). The indicator reflects the distribution of contraceptives, and only estimates the coverage, not the actual use or impact on the programme (NDoH 2012b:84). Data are collected daily in all areas where reproductive health services are offered and analysed periodically by the DHIS software.

Information obtained from the DHIS often lacks integrity when the quality is poor. Several factors have been identified as contributing to poor data quality and suboptimal use of available information. These include the lack of standardisation of the DHIS; the shortage of experienced information officers; the inadequate ICT infrastructure; the limited availability of paper-based data collection tools; and the lack of attention paid to the efficiency and effectiveness of data collection tools to provide useful information (NDoH 2011:12; Wright et al 2017:54). Insufficient knowledge, skills, feedback, and involvement from data producers (mainly nurses and doctors) who are expected to invest substantial time in the data generation process, were also found to contribute to poor data quality (Rohde, Shaw, Hedberg, Stoops, Venter, Venter and Matshisi [Sa]:202; Wright et al 2017:54).

## 1.3 STATEMENT OF THE RESEARCH PROBLEM

Reproductive health care is recognised as one of the health service components necessary for ensuring healthy lives and promoting all people's wellbeing (Osborn et al 2015:13). To function optimally, the DHIS should produce quality, relevant, reliable and accurate data on routine basis to monitor the performance of the reproductive health service, in this case, data on the CYPR. The rate presents the estimated protection provided by family planning services for one year, as well as the volume of programme activity (HST 2016:98). Furthermore, the information generated from the system should be used to support decision-making on reproductive health service improvements.

For the past few financial years (from 2014 to 2016), the Tshwane district has been underperforming on the CYPR. The district's performance was 22.2%, 38.4% and 35.8%, respectively, against the target of 36%, 55% and 60%, respectively (Massyn, Day, Peer, Padarath, Barron & English 2014:184; Massyn et al 2015:144; Massyn, Peer, English, Padarath, Barron & Day 2016:172). In 2017, the district managed to perform above the target; 54.5% against the target of 50% (Massyn et al 2017:33). However, in 2018 and 2019, performance dropped again to 51.8% and 50.1%, against the target of 59.8% and 61%, respectively (Massyn, Pillay & Padarath 2019:158; Massyn et al 2020:70).

The performance of the CYPR was below the target regardless of service improvement efforts which were initiated in 2012 to expand coverage and contraceptive methods to include the intrauterine contraceptive device (IUCD) and the progesterone implant (NDoH 2012b:8). The poor performance led to uncertainties regarding the functioning, quality and reliability of data produced from the DHIS. Questions were thus raised about the behaviour of data collectors, users of data, the tools used to collect data, and the context in which data processes took place. Hence, there was a need to evaluate the performance of the RHIS using DHIS in managing reproductive health information routinely.

## 1.4 RESEARCH PURPOSE

The study's purpose was to evaluate the performance of RHIS using DHIS in generating quality reproductive health information (couple year protection) in the Tshwane district, with particular focus on the factors involved in data management processes and the use of information in decision-making. The ultimate aim was to develop strategies to improve the management of routine reproductive health data, thereby improving the quality and the use of information for decision-making.

### 1.4.1 Research objectives

The objectives of the study were to:

*Phase 1:*

- Determine how the RHIS is used to produce reliable and quality routine reproductive health data.
    - Sub-objectives:
        - To explore HCPs' understanding of reproductive health data management.
        - To determine HCPs' perceived confidence in performing reproductive health information management (HIM) tasks.
        - To examine HCPs' views regarding the organisational factors influencing reproductive health data management tasks.
        - To establish HCPs' views regarding the usability of the data collection tool.
- To assess the quality of reproductive health data at the facility.

*Phase 2:*

- To explore managers' role in the management of reproductive health information.
- To assess reproductive health information's use in decision-making at the facility.
- To identify barriers and opportunities for effective data management processes.

*Phase 3:*

- To develop strategies for improving reproductive health data management.

### 1.4.2 Research questions

The following research questions emanated from the main study objectives:

*Phase 1*

- How is the RHIS used to generate accurate, relevant, reliable and quality routine reproductive health data?
- What is the quality of the reproductive health data generated from the RHIS?

*Phase 2*

- What is managers' role in the management of reproductive health information?
- How is reproductive health information used in decision-making?
- What are the barriers and opportunities for effective reproductive data management?

*Phase 3*

- Which strategies could be implemented to improve reproductive health data management?

## 1.5 SIGNIFICANCE OF THE STUDY

Reproductive health service is one of the essential interventions for improving the health of women and children. It offers good value for investment in health because it impacts nearly all the SDGs, including no poverty, zero hunger, good health and wellbeing, quality education and gender equality. The programme allows the family to plan for the number of children they intend to have, considering their socioeconomic status (Starbird, Norton & Marcus 2016:193-196). The programme also makes considerable contributions to the prevention of maternal and child mortality (Chola, McGee, Tugendhaft, Buchmann & Hofman 2015:1).

For the reproductive health programme to function appropriately and achieve the SDGs, the health information system must generate credible data that will provide good evidence for decision-making. The health information system is instrumental in

addressing health delivery issues and strengthening the health system by generating credible evidence about health services. It is also critical for decision-making at every level of the health system (Wandera, Kwagala, Nankinga, Ndugga & Kabagenyi 2018:9).

The study intended to discover and reveal the functioning and implementation of the RHIS in generating routine reproductive health data and the quality of the generated data. Furthermore, the researcher aimed to reveal the extent to which reproductive health information is used for decision-making at the facility level, using the Performance of Routine Information System Management (PRISM) framework.

The PRISM framework revealed the process of data management, the level of data quality, and the use of information for decision-making at the facility level. It also facilitated the discovery of factors affecting the performance of the RHIS, and the strengths and weaknesses of the system were identified. Moreover, it provided guidance on how data producers, managers, decision-makers, and other stakeholders could improve the functioning of the RHIS. Ultimately, strategies for improving the performance of RHIS in managing reproductive health information were developed. Health information managers and facility managers would thereby address their facility's challenges relating to data collection, processing, presentation, and use of information. The reproductive health programme managers would also be able to employ strategies to measure and address service issues affecting the reproductive health programme's performance. Furthermore, it is anticipated that the study will provide the non-governmental organisations (NGOs) supporting the department of health with the necessary information required to provide support to improve the health information system.

## 1.6 DEFINITIONS OF KEY CONCEPTS

**Accessibility of data** refers to the ease with which users can obtain information and the suitability of the form or medium through which the information can be accessed (PEPFAR, USAID & MEASURE Evaluation SIFSA 2015:9; NDoH 2011:26). In this study, the definition of accessibility of data is adopted as defined above.

**Accuracy**, also known as validity, entails measuring data against a referenced source and finding it to be correct and reflecting actual health activities (USAID & MEASURE Evaluation 2015:39; NDoH 2012a:4). In this study, accuracy refers to the correspondence between data recorded monthly on the summary report and data presented in the DHIS software.

**Availability** means the ability to be used or obtained (Compact Oxford English Dictionary 2006, “availability”). In this study, availability refers to the accessibility of facility reproductive health performance data when required by users.

**Comparability** is the ability to compare data on the same characteristics between different points in time and geographical areas (PEPFAR et al 2015:9; NDoH 2011:28). In this study, this definition of comparability is adopted.

**Completeness** refers to data being present and usable, representing the complete list of all eligible sources, and not just a fraction thereof (PEPFAR et al 2015:9; NDoH 2012a:4). In this study, completeness refers to the availability of data in all reporting forms, including the MDS sheet, monthly report and DHIS software.

**Couple year protection rate (CYPR)** is an indicator that measures the percentage of women aged 15 to 49 years who are protected against unplanned pregnancies for one year using modern contraceptive methods, including sterilisation (Massyn et al 2019:155). In this study, the CYPR refers to the tool used to estimate women’s protection from pregnancy for a one-year period, evaluate programmes, and measure contraceptive coverage by different methods.

**Data collection** in the RHIS means taking the source data and transferring these into tools (paper or electronic) from which they can be collated, analysed, reported and used (PEPFAR et al 2015:13). In this study, the meaning of data collection is adopted as defined above.

**Data elements** are the simplest form of data collected and reported of activities carried out at the facility (NDoH 2011:22). In this study, data elements are all reproductive data elements collected for reproductive health services, used to calculate the CYPR.

**Data processing** in the RHIS involves data capturing, data quality checking, and data analysis (PEPFAR et al 2015: 13). In this study, this meaning of data processing is adopted.

**Evaluation** is defined as a process of measuring (Mimi 2015:69). In this study, evaluation refers to an assessment of the RHIS operations, such as the input, processes and outputs as defined on the PRISM framework.

**Impact** is the ultimate goal of the health information system, and entails the reduction of morbidity and mortality, and improved health status (PEPFAR et al 2014:24). In this study, this definition of impact is adopted.

An **indicator** is a quantitative and qualitative variable that provides a simple and reliable measurement of one aspect of performance, achievement or change in a programme or project (USAID & MEASURE Evaluation 2015:6; PEPFAR et al 2014:31). In this study, an indicator is a quantitative measure used to measure the reproductive health programme's performance.

**Inputs** are all the resources needed to carry out activities (USAID & MEASURE Evaluation 2015:12; PEPFAR et al 2014:17). In this study, inputs are all the resources needed to collect and process data, including data elements, collection tools and other resources (staff, finance, equipment and policies).

**Integrity** refers to values and related practices that promote users' confidence in the system producing accurate health information, and ultimately, in the health information itself (PEPFAR et al 2015:9; NDoH 2011:25). In this study, this definition of integrity is adopted.

**Outcomes** are the intermediate results achieved by a specific system. The outcome of the health information system is efficient and effective health service delivery due to the use of information (PEPFAR et al 2014:24). In this study, the definition of outcomes is adopted as defined above.

**Outputs** are the immediate products or results of the system's activities or services, including coverage and knowledge. The health information system's output is the production of timely, accessible and accurate information and the use of information (USAID & MEASURE Evaluation 2015:12; PEPFAR et al 2015:21). In this study, this definition of outputs is adopted.

**Performance** means an act of carrying out a task or function (Compact Oxford English dictionary 2006, "performance"). This study defines 'performance' as the manner in which the RHIS generates quality reproductive health data and how it facilitates the use of the information for evidence-based decision-making.

**Processes** are the actions or activities that require available resources (inputs) to produce desired outputs. Activities for HIM include data collection, collation, validation, capturing, analysis, presentation, and the dissemination of information (MEASURE Evaluation 2015:12; PEPFAR et al 2014:21, PEPFAR et al 2015:17). In this study, this definition of processes is adopted.

**Reliability** refers to consistently collected data, generated by an information system based on protocols and procedures that do not change according to who is using them or how often they are used (NDoH 2012a:4). In this study, reliability refers to data being collected based on data elements' definitions, and the District Health Management Information System (DHMIS) Standard Operating Procedure (SOP) requirements.

**Relevant** means appropriate to the current matter (Compact Oxford English dictionary 2006, "relevant"). In this study, relevance refers to the collection of appropriate data required for reproductive health information management.

**Timeliness** refers to data being available on time for meeting budgeting, monitoring, decision-making and reporting requirements (NDoH 2012a:4 PEPFAR et al 2014:60). In this study, timeliness refers to the monthly submission of data to the district office within the specified period.

**Use of information** means being aware of available data and considering it when making decisions (PEPFAR et al 2015:10).

## 1.7 OPERATIONAL DEFINITIONS

**Data quality:** In this study, data quality refers to data suitable for use and free of omissions and unnecessary variations. It reflects accurate, complete and timely data.

**District Health Information System (DHIS)** is free and open-source information software system adopted as a national standard to collect data, process, analyse and present information to support decision-making in reproductive health care contexts.

**Generation of data:** In this study, the generation of data refers to the process of reproductive health data's collection, processing, analysis and display of data to facilitate the use of the information.

**Health care providers (HCPs):** In this study, HCPs refer to doctors, professional and enrolled nurses providing reproductive health care services in Tshwane district, region 3.

**Performance:** This study defines 'performance' as the manner in which the RHIS generates quality reproductive health data and how it facilitates the use of the information for evidence-based decision-making.

**Reproductive health information:** In this study, reproductive health information refers to analysed contraceptive data (e.g. on IUCDs inserted, Medroxyprogesterone injections administered, Norethisterone injections administered, oral pill cycles issued, subdermal implants inserted, condoms issued and sterilisations performed) generated by HCPs through the RHIS.

**Routine health information system (RHIS):** In this study, the RHIS refers to the use of DHIS to collect, process, analyse, present reproductive health data at specific, stipulated intervals and the use of the reproductive health information to manage and monitor the service.

**Use of information:** The study defines 'use of information' as the documented use of reproductive health information as evidenced by the availability of monthly reports, displays of information, and the availability of operational plans reflecting targets and actions.

## 1.8 FOUNDATIONS OF THE STUDY

In the sections to follow, the foundation of the study is discussed in terms of the philosophical paradigm and theoretical framework (PRISM framework) adopted for this study.

### 1.8.1 Pragmatic paradigm

Nieuwenhuis (2017:52) describes a research paradigm as a worldview or perspective held by researchers based on a set of assumptions, concepts, values and practices. It is a viewpoint based on researchers' philosophies about the social world and the nature of knowledge (De Vos, Strydom, Fouché & Delport 2017:513). The research paradigm includes a set of philosophical assumptions about the nature of reality (ontology), the relationship between the inquirer and those being researched (epistemology), the role of values in research (axiology), and how evidence is best obtained (methodological) (Polit & Beck 2017:10).

There are three widely used paradigms, namely positivism, constructivism, and pragmatism. The selection of a specific paradigm is influenced by the researcher's beliefs, orientation and experience in the field of study (Polit & Beck 2021:8). The researcher adopted a pragmatic view, believing in enhancing evidence with the use of all available strategies. The pragmatic paradigm is associated with mixed-method research, which rejects the forced choice between positivist and constructivist modes of inquiry (Polit & Beck 2021:587). Delport and Fouché (2017:438) support this view by stating that pragmatism "rejects the either/or choices associated with the paradigm war"; they advocate for the use of mixed-method research, which brings together multiple sources of knowledge to find workable solutions. Pragmatism takes the research question and the knowledge needed into account before selecting the methodology. With pragmatism, the research question is vital and should drive the

inquiry process. Ultimately, the selection of the methodology is guided by the desired outcome of the study (Gray & Grove 2021:386; Polit & Beck 2017:739).

**Ontology:** In this study, it was important for the researcher to obtain multiple realities on data management processes, data quality and use, and reproductive health information. Therefore, the HCPs and managers were deemed fit to present their unique and authentic realities of the functioning of the RHIS.

**Epistemology:** The researcher combined the objective and the subjective methods of obtaining knowledge by applying different data collection methods to gain an in-depth understanding of data management processes and the factors influencing the process. The research problem was the central focus and area of concern. Pragmatists do not believe in striving to find the truth or reality, the existence of which is continuously disturbed, but aim to facilitate problem-solving (Parvaiz, Mufti & Wahab 2016:68). A pragmatist aims to determine 'what works' best for understanding a particular research problem and find a solution to the problem. The researcher plays a considerable role in the interpretation of the results (Parvaiz et al 2016:68). Moreover, pragmatists believe that inductive and deductive reasoning is important, for both theory generation and theory verification to be achieved (Polit & Beck 2021:587).

As a pragmatist, the researcher used a mixed-methods approach in which both quantitative and qualitative methodologies were implemented in one study (Gray & Grove 2021:79). Leavy (2017:162) defines 'mixed-method research' as a type of research where qualitative and quantitative research approaches are combined to increase the breadth and the depth of understanding of a phenomenon under study. It allows the use of multiple methods, flexibility in choosing the strategies to address the research question, and offers rich contextual interpretations (Ivankova, Creswell & Plano Clark 2017:312). This enabled the researcher to develop comprehensive strategies to improve reproductive health data management based on combined findings.

**Methodology:** The researcher needed to choose the research process that provided the best evidence. The rationale for choosing mixed-method research was to gather information that would provide a better, fuller and more in-depth understanding of the

research problem and validate findings. Delport and Fouché (2017:436) identified the following benefits of mixed-method research:

- It allows the researcher to address confirmatory and exploratory questions by using both qualitative and quantitative approaches, consequently allowing theory verification and generation in the same study.
- It provides strength that offsets the weaknesses of both quantitative and qualitative research and, therefore, can generate better results.
- It provides more comprehensive evidence for studying research problems than either qualitative or quantitative approaches alone can provide.
- It creates the opportunity for a greater assortment of conflicting views and perspectives, and alerts the researcher to the possibility that issues are more multifaceted than expected.
- It encourages the use of multiple world views rather than typical associations to a specific paradigm.
- Researchers are free to use all possible methods to address a research problem.
- It eliminates bias and improves various forms of validity and quality.

Considering the complexity and importance of the health information system in monitoring health care services, the researcher utilised both approaches to better understand and gather extensive evidence on the functioning of the RHIS in the generation and use of reproductive health information. Polit and Beck (2021:588) affirm that programme evaluation that focuses not only on the outcome but also on how the programme functions (processes) requires an integration of both quantitative and qualitative information. Therefore, the pragmatism paradigm was deemed suitable for the study because the researcher values both objective and subjective aspects of the study.

### 1.8.2 Performance of the Routine Information System Management (PRISM) framework

Theoretical frameworks help researchers organise their study and provide the context in which they examine the problem, collect and analyse data (Brink, van der Walt &

van Rensburg 2018:21). It reflects the stance the researcher adopts and shows the interconnectedness of the concepts that are assessed. It also helps to delineate the study and the framework (Henning, van Rensburg & Smit 2017:25).

The study's theoretical framework was based on the PRISM framework (USAID & MEASURE Evaluation 2019a:9); a modified version of the logic model, also called the 'result-based monitoring and evaluation system model'. The framework focuses on the relationship between inputs, processes, outputs, outcomes and the impact of a programme (PEPFAR et al 2015:23).

The framework assumes that there are factors (inputs) that determine the performance of the system. The factors/determinants are technical, organisational and behavioural and affect the processes (data collection, processing and presentation), ultimately influencing the output (data quality and use of information), outcome (health system performance), and impact (improved health status) of the system (USAID & MEASURE Evaluation 2019a:9). This framework was utilised to evaluate the performance of the RHIS by examining the first three components of the model because they directly affect data quality and the use of information. The outcome and impact were not examined in this study since they are usually assessed over an extended period (e.g. minimum of five years).

Inputs assessment focused on routine information system determinants which included technical factors (e.g. data collection forms, information technology and procedures), organisational factors (e.g. availability of resources, training and supervision), and behavioural factors (e.g. data quality checking skills, problems solving skills, competence and confidence). Process assessment incorporated all activities involved in generating the information, including data collection, processing, quality checks, analysing and giving feedback. The output is the performance of the system, which is based on the quality of data generated from the RHIS and the use of information for decision-making (USAID & MEASURE Evaluation 2019a:9).

In this study, the PRISM framework was applied over two different phases. The RHIS determinants (technical, organisational and behavioural factors), and one component of output (data quality) were assessed in phase one of the study. On technical factors,

the paper-based data collection tool's usability was assessed based on its efficiency and effectivity in data collection. Moreover, the availability of necessary resources and support in the form of training and supervision were assessed as organisational factors. The understanding of reproductive health data management, together with HCPs' confidence level in data management tasks, were assessed as behavioural factors. The overall data quality was measured by assessing three data quality dimensions, namely timeliness, completeness, and accuracy. The data management processes and the use of information were assessed in the second phase using qualitative methods.

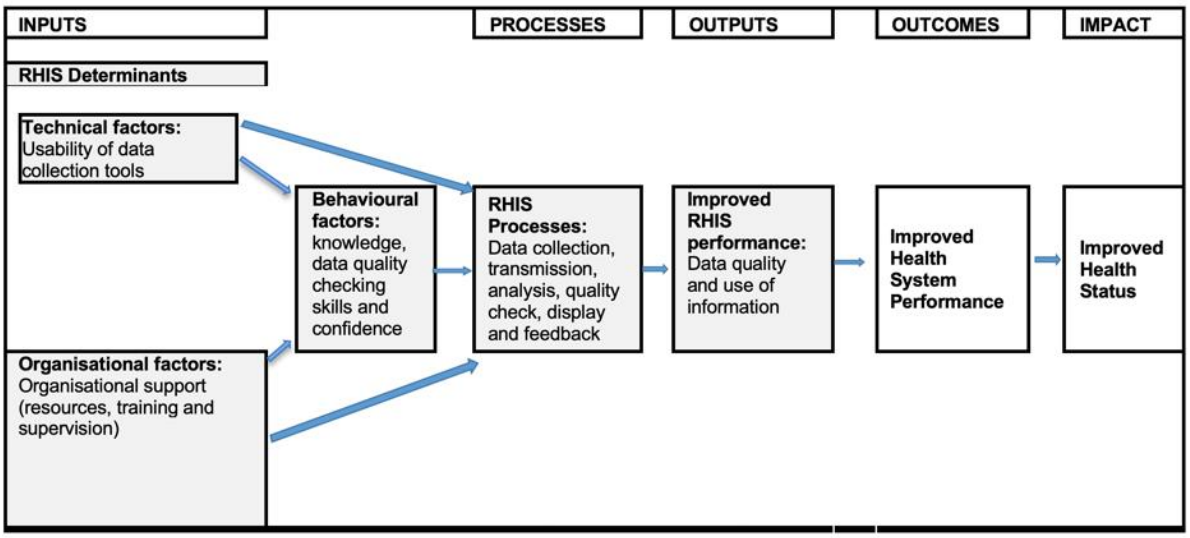


**Figure 1.1: PRISM framework (USAID & MEASURE Evaluation 2019a:9)**

## 1.9 RESEARCH METHODOLOGY

The research methodology describes the study's approach and techniques, population, sampling frame, sampling technique, sample size, data collection and analysis, strategies to ensure scientific rigour, as well as ethical considerations (Brink et al 2018:187).

### 1.9.1 Research design

The research design is the researcher's plan for addressing a research problem or answering research questions, taking the number of research participants, the time required for data collection, and research interventions into consideration (Gray &

Grove 2021:809). This study involved methodological triangulation, meaning the design combined both quantitative and qualitative strategies. Numerical and textual information was collected and brought together to answer the research question and draw conclusions about the phenomenon under study (Gray & Grove 2021:394).

This study adopted sequential explanatory mixed methods, involving both quantitative and qualitative approaches. The first phase entailed collecting and analysing quantitative data, followed by the second phase, which involved the collection and analysis of qualitative data (Polit & Beck 2021:594). Both designs were given equal priority and findings were integrated during the interpretation phase. Phase three followed, which involved the development of strategies to improve routine reproductive health data management. The strategies were evaluated by experts in health information, reproductive health, and capacity building.

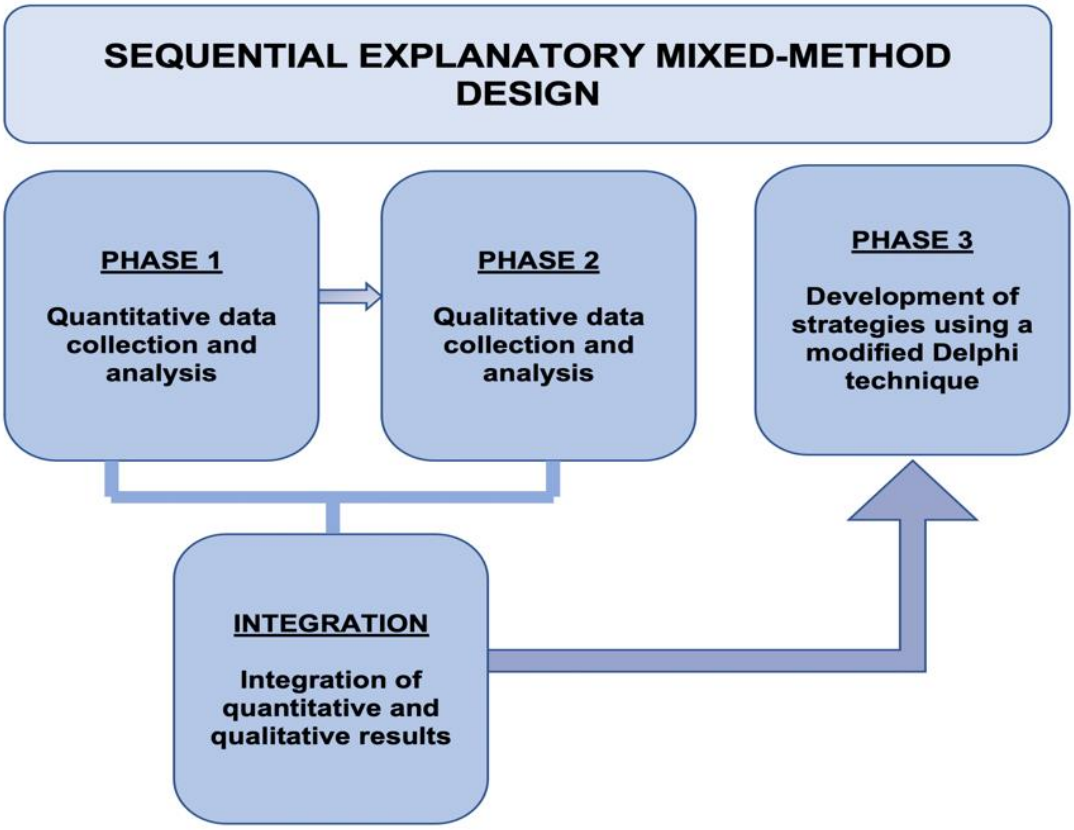


**Figure 1.2: Sequential explanatory mixed-method design**

### 1.9.2 Population and sample

A population is an entire group of people or elements that represent the focus of the research (Gray & Grove 2021:60). Different population groups were utilised in different phases. The population for phase one was HCPs (because they are the data collectors), monthly reports, and management directives because they provide evidence of data quality. The population for phase two was facility managers because they are responsible for health information at the facility and ensure the production of high-quality data and the use of information. Phase three's population included health information, reproductive health and capacity-building experts from the department of health and NGOs supporting the department of health.

Gray and Grove (2021:410) describe a sample as "a subset of the population that the researcher selects for participation in the study". Different sampling techniques were applied in different phases of the study. Thirteen healthcare facilities belonging to Tshwane district, Region 3, and the Tshwane district office were selected. The stratified random sampling technique was utilised to proportionally select HCPs from each stratum (doctors, professional and enrolled nurses) to ensure true representativeness. Then, purposive critical-case sampling was applied to select managers, and purposive sampling was used to select experts. The research methods are discussed in detail in Chapter 3. Table 1.1 presents a summary of the research methods employed in this study.

**Table 1.1: Summary of research methods**

| | **Phase 1**<br>**Quantitative** | **Phase 2**<br>**Qualitative** | **Phase 3**<br>**Delphi** |
|---|---|---|---|
| **Population** | HCPs, health information monthly reports and management directives | Facility managers | Facility managers, Health information, Reproductive health and capacity-building experts |
| **Sampling and sample** | Stratified random<br>Professional nurses =92<br>Enrolled nurses =13<br>Doctors = 6<br>Total = 111 | Purposive critical case<br>Facility managers=11 | Purposive<br>Round 1=16<br>Round 2= 10 |

| | Phase 1<br>Quantitative | Phase 2<br>Qualitative | Phase 3<br>Delphi |
|---|---|---|---|
| **Data collection method** | Self-administered questionnaire and checklist | In-depth interviews | Virtual meeting and Survey using questionnaires |
| **Data analysis** | Descriptive statistics and multivariate statistical analysis | Thematic presentation | Descriptive statistics |

## 1.10 SCOPE AND LIMITATIONS

The study evaluated the performance of the RHIS, using the DHIS in managing reproductive health information in Tshwane district, Region 3. The study's scope was limited to only health information generation processes, the level of data quality, and the use of reproductive health information, including factors influencing data quality and use of information. Reproductive health data from other sources (e.g. demographic surveys) were not included, and information from other health programmes was not evaluated.

## 1.11 STRUCTURE OF THE THESIS

This thesis has eight chapters, and is divided as follows:

**Chapter 1: Overview of the study**

The first chapter provides the study's orientation and includes the background to the research problem and problem statement. The purpose of the study, research objectives, the significance of the study, definitions of key concepts, theoretical foundation, scope and limitations of the study are also discussed in this chapter.

**Chapter 2: Literature review**

This chapter presents the literature review. The review covers studies on RHIS data generation processes, data quality, use of information, and factors influencing data quality and use of information.

**Chapter 3: Research methodology**

The chapter discusses the research design and methods employed in this study, which include the study population, sample and sampling, data collection and analysis, validity and reliability, trustworthiness, and the ethical considerations of the study.

**Chapter 4: Data analysis and presentation of quantitative results**

The chapter presents the data analysis and quantitative results of the study.

**Chapter 5: Analysis, presentation and integration of qualitative findings with literature**

The chapter offers the analysis, presentation, discussion and integration of qualitative findings with the literature.

**Chapter 6: Integration, interpretations and discussions of the findings**

The chapter reports on the integration of the quantitative and qualitative results, interpretations and discussions of the findings.

**Chapter 7: Strategies for improving reproductive health data management**

This chapter covers the development and discussion of strategies for improving reproductive health data management.

**Chapter 8: Summary, contributions, recommendations, limitations and conclusions**

This chapter presents a summary of study findings and the development of strategies. It discusses the contributions of the study and makes recommendations for data management stakeholders and further research. The limitations of the study are also highlighted.

## 1.12 SUMMARY

Chapter 1 provided an overview of the study. The research problem, purpose, objectives, questions and definitions of terms relevant to the study were explained. The significance of the study and the research methodology were also introduced. The

theoretical foundation guiding the study was explained and applied throughout the research process. The next chapter presents the literature review relevant to the health information system.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 INTRODUCTION

A literature review is an organised written presentation of the researcher's interpretations of published work on the phenomenon under study (Gray & Grove 2021:152). Polit and Beck (2021:82) describe the literature review as a written synthesis and appraisal of evidence on a research problem. The purpose is to discover recent, relevant information about the phenomenon and create a picture of what is known, and what needs to be known (Brink et al 2018:58; Gray & Grove 2021:152). It contributes to a richer understanding of the nature and meaning of the problem under study (Fouché, Delport & de Vos 2017:144).

In this chapter, existing information about health information systems, the DHIS, and RHIS is reviewed. The performance of the RHIS is viewed from the perspective of improved data quality and continuous use of health information as an output of the system (Teklegiorgis, Tedesse, Mirutse & Terefe 2016:2). Detailed descriptions of the operations of the RHIS generating quality health data and the use of health information for decision-making are provided. Furthermore, RHIS determinants, which include technical factors, organisational factors, and behavioural factors, are described in relation to how they affect the system's processes and outputs.

## 2.2 HEALTH INFORMATION SYSTEMS

Health information systems are one of the six core components of a health system and form the foundation of the health system because it informs decision-making in all other health systems' components (Abera, Daniel, Letta & Tsegaw 2016:100; USAID & MEASURE Evaluation 2019a:6). The purpose of health information systems is to coordinate data collection, the processing, analysis and synthesis of data, and disseminate timely, quality information to decision-makers. The information generated is used in improving the efficiency and the effectiveness of health services and accounting to the general public and partner agencies (Abera et al 2016:99; Alipour &

Ahmadi, 2017:313; Macfarlane & Abouzahr 2019:7; Shiferaw et al 2017:2). Users of health information, which include policymakers, health system managers at the district, province, and national level, HCPs and communities at large need to identify the type of data needed and the relevant data sources available for generating the required health information (Macfarlane & Abouzahr 2019:8). It is therefore recognised that information required by the health system is not only generated in the health sector but also from other sectors, including the civil registration, population census, household survey, demographic survey, and health service data. The information is generated on a continuous and periodic basis (USAID & MEASURE Evaluation 2019a:13; Thomas 2016:1).

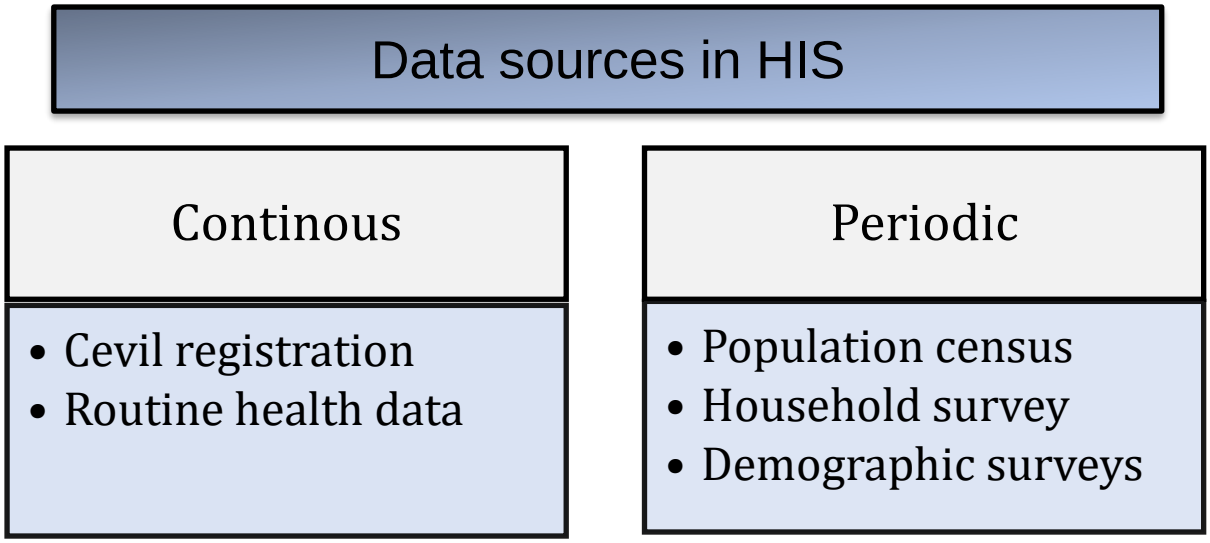


**Figure 2.1: Data sources in the health information system**

Civil registration is a continuous, compulsory, permanent and universal recording of vital events, mainly births, deaths, marriages, divorces and adoptions. It is a legal requirement by the country to record vital events and generate legal documents required by law, such as birth and death certificates (Jackson Wenz, Muniz, Abouzahr, Schmider, Braschi, Kassam et al 2018:861; Macfarlane & Abouzahr 2019:325). Since the civil registration is a continuous process, it generates up-to-date demographic and health indicators such as fertility rates, population growth rates, life expectancy, mortality rates by age, sex and cause (Macfarlane & Abouzahr 2019:129). The information generated from the civil registration is considered crucial for monitoring and improving reproductive, maternal, neonatal, child and adolescent programmes and health outcomes (Jackson et al 2018:861). Furthermore, it is useful in

understanding changes in the population over time and essential for health care planning and policy-making (Peters 2016:7).

In addition to civil registration, routine health data are collected from the patient-provider interaction. The data are routinely collected during consultations in the hospitals, primary health care facilities and the community during outreach health services (Zweigenthal et al 2017:227). Only data that are integral for the service being provided are collected to ensure good management of patients. Such routinely collected information is described as a health management information system (Macfarlane & Abouzahr 2019:166).

A population census is a periodic count of the entire population living in a defined geographical location (Macfarlane & Abouzahr 2019:325). It is further described as a snapshot of the population at a given time, predominantly every ten years in many countries (Regmi & Gee 2016:48). Data generated from the census is used to describe the population structure of a geographic area according to age and sex (Macfarlane & Abouzahr 2019:325). Furthermore, it is used to generate mid-year population estimates which are, in turn, used in the measurement of population-based indicators like mortality and life expectancy rates (Regmi & Gee 2016:48; Zweigenthal et al 2017:227). Most importantly, the health sector uses census data to position health centres and specialised referral services. The catchment population size derived from the census data enables health authorities to plan for the health services required in a specific area; for example, the number of childbearing women requiring reproductive, maternal and child services (Macfarlane & Abouzahr 2019:108).

Besides the population census, household surveys were recognised as the most critical source of population-based health information. Household surveys provide data required for measuring the health status of the population, health service coverage, health-related behaviours and risk factors like unsafe sex, smoking, substance abuse and poor nutritional status (Mbondji, Kabede, Soumbey-Alley, Zielinski, Kouvividila & Lusamba-Dikassa 2014:38; Macfarlane & Abouzahr 2019:11). It can also measure the quality of services in other sectors like education, social security, housing, energy and water access and sanitation (STATS SA 2016:1).

Like household surveys, demographic health surveys are also population-based and collect information on population characteristics and the causes of population changes and their consequences. Information collected from the demographic health surveys accurately reflects prevailing disease burdens and could be used to track and monitor new health threats. In addition to fertility and mortality data, demographic health surveys are used to collect data that are usually collected at the health facilities, like human anthropometry, contraceptive use, and HIV prevalence information (STATS SA 2017:xiii; Zweigenthal et al 2017:227).

## 2.3 HEALTH MANAGEMENT INFORMATION SYSTEM

Health management information systems (HMIS) is an information system whereby health service data are recorded, stored, retrieved, processed and used for decision-making (Endriyas, Alano, Mekonnen, Ayele, Kelaye, Shiferaw et al 2019:1; Teklegiorgis et al 2016:1). HMIS are further described as databases used for storing and transforming data into information. Data are collected at the lower level, which is health care facilities, and sent to the central levels, which are district offices for the transformation of data into information (Muhindo, Joloba & Nakanjako 2016:7). The HMIS is specifically designed to assist in the management and planning of health programmes by availing information to stakeholders and decision-makers (Abera et al 2016:99; Shiferaw et al 2017:2).

Teklegiorgis et al (2016:1) argue that a good HMIS should facilitate the collection of data that is required or relevant to users and available for processing. Only the minimum data required should be collected so that data analysis can be done quickly, and the information should be simple to understand. Furthermore, the system should be able to generate and provide correct information to the user through a feedback mechanism and the sharing of data. Vertical and horizontal feedback is regarded as an essential component of the reporting system (Ali, Naureen, Noor, Boulos, Aamir, Ishaq et al 2018:1).

The information generated through the HMIS is required in improving health service effectiveness and efficiency through better and appropriate management at all levels of health services (Teklegiorgis et al 2016:1). The HMIS is also used to track a

particular dimension of service quality, thereby improving patient satisfaction (Shiferaw et al 2017:2). Ali et al (2018:2) suggest that data generated through HMIS is beneficial because it informs decisions about service delivery, patient safety, conducting research, and measuring the effectiveness of the clinical pathways. The decision-making involves planning, organising, managing and controlling health care facilities either at the national, provincial, district or facility level. Similarly, Abera et al (2016:99) state that the HMIS is supposed to assist in the management and planning of health programmes as opposed to directly assisting in the delivery of care.

Above all, the HMIS is regarded as a significant component of the health information system that brings together data from multiple sources such as household surveys, censuses, civil registration systems, health facilities and community-based sources (Macfarlane & Abouzahr 2019:15). Demographic data obtained from censuses, civil registration systems and surveys generate denominator data that are required to calculate national health indicators (Macfarlane & Abouzahr 2019:301). Consequently, this data significantly contributes to country-level monitoring and evaluation by generating indicators about inputs, outputs, outcomes and the impact of health programmes (Macfarlane & Abouzahr 2019:169). Despite the importance of HMIS in health service management, it has been reported that HMIS in developing countries are ineffective because of the unreliability of routinely collected data produced by the system, resulting from poor data quality and under-reporting (Kabakama et al 2016:85).

## 2.4 ROUTINE HEALTH INFORMATION SYSTEM

An RHIS is a system that is continuously collecting data on individual health statuses, health interventions, and health resources. The system provides information at regular intervals to meet the expected information needs (Afe, Akinmurele, Olatoun, Oduola, Agboola & Onyema 2018:212). The RHIS “ensures the production, analysis, dissemination, and use of reliable and timely information” (O’Hagan, Marx, Finnegan, Naphini, Ng’ambi, Laija et al 2017:368).

The system also generates data on health statistics and indicators to track progress towards universal coverage of health services and inform planning and the monitoring of performance (Maïga, Jiwani, Mutua, Porth, Taylor, Asiki et al 2019: 1). It is further regarded as the backbone for facility-level micro-planning and higher-level decision-making (Wagenaar et al 2015:2).

The RHIS in South Africa and other developing countries use DHIS to collect, collate, capture, store, report, analyse and present routine data (Begum, Khan, Adamou, Ferdous, Parvez, Islam et al 2020:2; NDoH 2011:11; Wright et al 2017:54). In South Africa, the DHIS was approved by the National Department of Health (NDoH) according to the National Act 61 of 2003 requirements (NDoH 2011:09). The DHIS provides a useful means of establishing baselines for community health statuses and disease burdens that can be compared across districts and over time. The system generates information that is used to assess community health needs, the impact of health interventions, and evaluate health programmes' performance (Wangdi, Sarma, Leaburi, McBryde & Clements 2020:62). Furthermore, the DHIS has shown to be a key supportive element for "effective strategic planning, priority setting, and decision making", consequently enabling districts to assess whether goals, objectives, indicators and targets based on both strategic and operational plans are met (Begum et al 2020:2). The DHIS does not generate health information haphazardly but follows the information cycle (see Figure 2.2).

Health facilities collect data daily in the form of data elements, which are based on national indicator data sets (NIDS) and provincial indicator sets (PIDS) developed by both the national and provincial department of health, respectively (Wright et al 2017:54). The indicators consist of two or more data elements in which one will be a numerator, and the other will be the denominator. The numerator indicates health service activities, while the denominator indicates the population served (HISP [Sa]:5; USAID & MEASURE Evaluation 2015:16). Indicators are used to measure programme changes directly or indirectly, thus measuring the amount, effectiveness, and impact of the service provided to the community (USAID & MEASURE Evaluation 2015:6).

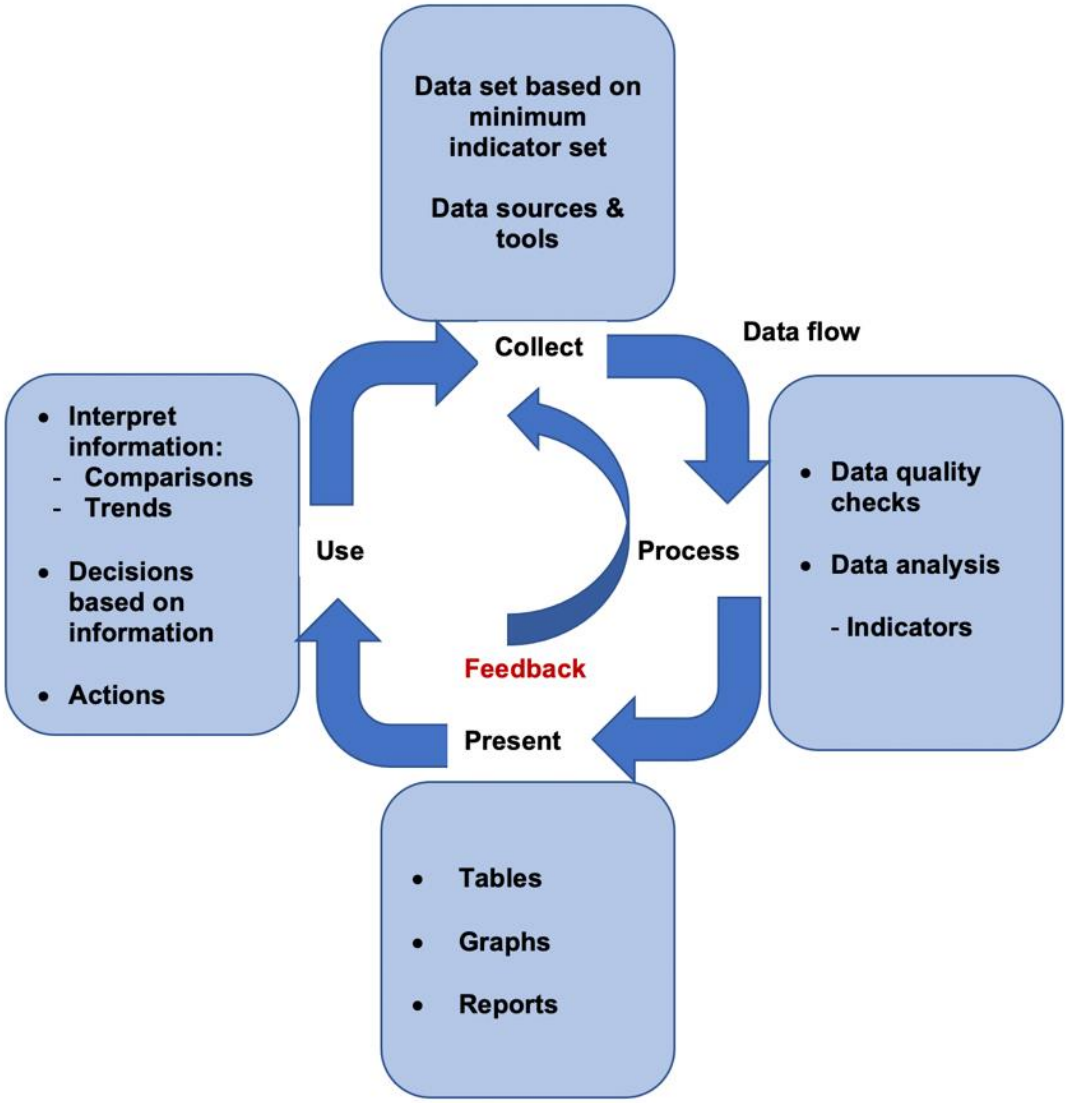


**Figure 2.2: The information cycle: A framework for data-handling process in health facilities (Source: Garrib, Stoops, Mckenzie, Dlamini, Govender, Rohde & Herbst 2008:550)**

Data on routine health interventions are recorded on a standardised register, also called the MDS tool, by ticking the data element representing the service provided (NDoH 2011:19; Endriyas et al 2019:2). The tools are in a paper format with predetermined columns enabling data collectors to mark data elements explicitly stating the service provided (Maïga et al 2019:2). The HCPs collate data daily, and a data capturer captures the data in the electronic tool either daily or weekly. Collected data are aggregated monthly for the entire facility (NDoH 2012a:11; Wagenaar et al 2015:3).

It is therefore required that all data collectors validate collected data and conduct regular data quality checks. At the facility level, data verification is done by comparing data in the DHIS tool with the data recorded on patient clinical records/clinic files. Although all data collectors are required to conduct the quality check, the overall responsibility for data verification and quality check lies with the facility manager (NDoH 2012a:18; GP DoH et al 2016:92). However, in addition to the verification, the DHIS software can conduct some validation function by applying the validation rules embedded in the system before data analysis. The validation starts by preventing the capturing of values outside the specified ranges, followed by the implementation of validation rules (USAID & MEASURE Evaluation 2015:39).

Once data are validated and checked for quality, a monthly summary report is compiled and sent to the district health information managers by the seventh day of each month (Scott & Gilson 2017:6). The data are then imported into the DHIS software at the sub-district or district level for analysis (NDoH 2012a:16). Data analysis facilitates the comparison of actual performance with planned or expected performance and assesses progress towards targets. Facilities with access to the internet can instantly view the pivot table after analysis (USAID & MEASURE Evaluation 2015:47). At the district level, data across facilities are aggregated to provincial and the national level, resulting in a continuous time-series of repeated monthly counts of multiple health indicators (Wagenaar et al 2015:3).

Once data are analysed, it is the sub-district or district's responsibility to send monthly feedback to the facilities in the form of data quality and service performance reports (Scott & Gilson 2017:6). Pivot tables, graphs and maps are used as appropriate tools for presenting the information (USAID & MEASURE Evaluation 2015:47). Besides these emails, facility managers and programme managers also receive feedback in quarterly feedback meetings, facilitated by the monitoring and evaluation directorate. In the same manner, the NDoH sends feedback to the provinces, and provinces send feedback to the districts. Accordingly, facility managers are expected to give staff members monthly feedback regarding programme-related performance (NDoH 2012a:18), thus fulfilling the RHIS requirement of sharing information with data collectors and data producers at the facility and community level (NDoH 2012a:16; USAID & MEASURE Evaluation 2015:24).

Although the overall responsibility for using the information lies with the facility manager, all HCPs are required to use information when strategising to improve the performance of health care services (NDoH 2012a:18). It is further acknowledged that facility managers are responsible for facility health information management, thereby ensuring that facilities produce high-quality data that can be used to optimise patient care, the health status of the population, the performance of health programmes, and the healthcare system. The information is also used for budgeting purposes, planning for human resources, and other material resources required (NDoH 2012a:17). Seitio-Kgokgwe et al (2016:4) allude that the inbuilt data analysis capability of the DHIS promotes evidence-based decision-making and planning where services are delivered, which enhances the appropriateness and quality of health services and programmes.

## 2.5 REPRODUCTIVE HEALTH PROGRAMME DATA MANAGEMENT

The reproductive health programme, commonly known as family planning, include services, practices, information and commodities given to men and women, including adolescents, to prevent unplanned pregnancies (Starbird et al 2016:191). The programme is essential in achieving SDG3 (ensure healthy lives and promote wellbeing at all ages) by ensuring that women are not at risk of maternal and child deaths related to unplanned pregnancies. Furthermore, universal access to contraceptives is considered critical in preventing unplanned pregnancies, thereby improving the health and wellness of women and children. To improve maternal health globally, a well-functioning national health information system with relevant and reliable reproductive health information is required (Starbird et al 2016:194).

Few reproductive health indicators specifically focus on monitoring contraceptive access and use, generated from non-routine and routine data sources. Indicators from non-routine data sources focus on unmet needs for contraceptive services and dual method use, which are generated from demographic surveys and sentinel sides, respectively. Unmet needs for contraceptive services are calculated as a percentage of women who are married or in union and fertile but desire to either terminate or postpone childbearing but are not using any contraceptive method. Dual method use

is calculated as a percentage of women using two contraceptive methods, of which one of the methods is either a male or female condom (Stats SA 2017:16).

The CYPR rate is generated from the RHIS. The CYPR rate is described as the estimated protection provided by contraceptive methods over one year, calculated through the aggregation of monthly data elements of the DHIS programme (Massyn et al 2015:140; Massyn et al 2019:155). Data elements for reproductive health include the number of IUCDs inserted, Medroxyprogesterone injections administered, Noresthisterone injections administered, oral pill cycles issued, subdermal implants inserted, female sterilisations performed, male sterilisations performed, male condom and female condom distribution. All data elements are collected daily and aggregated monthly in the DHIS software, focusing on the female population aged 15 to 49 years to calculate the CYPR (Massyn et al 2015:140; Massyn et al 2019:155).

According to the NDoH (2016:108), some data elements – ICUD inserted, Medroxyprogesterone injection administered, Noresthisterone injection administered, oral pill cycle issued, subdermal implant inserted – are only recorded when the service is provided to women aged between 15 and 49 years. However, data on female sterilisation, male sterilisation, male condom and female condom distribution are recorded when the service is provided to either a male or female of any age group (NDoH 2016:109). These data are collected daily at the health care facilities using MDS collection tools and are validated weekly before being sent to the district monthly (NDoH 2012a:8).

The districts are expected to import data into the DHIS software program, validate and export data to the provincial offices on the 30$^{th}$ day of the reporting cycle. The provincial office imports, validates and exports data to the national office on the 45$^{th}$ day after the reporting cycle. On the 50$^{th}$ day of the reporting cycle, the national office imports, validates and reports data to the Southern African Regional Office. The provinces are expected to give feedback to the districts within five days, and districts are also expected to give feedback to the sub-districts or facilities with five days of reporting. The national office also imports data into the DHIS software, validates and saves the data on the server when completed. The national office is expected to give feedback to the provincial office within 60 days after the reporting period (NDoH

2012a:8) (see Figure 2.3). Although data management activities occur at every managerial level, the quality of data generated by the RHIS using the DHIS remains unsatisfactory in many developing countries (Alipour & Ahmadi 2017:314).

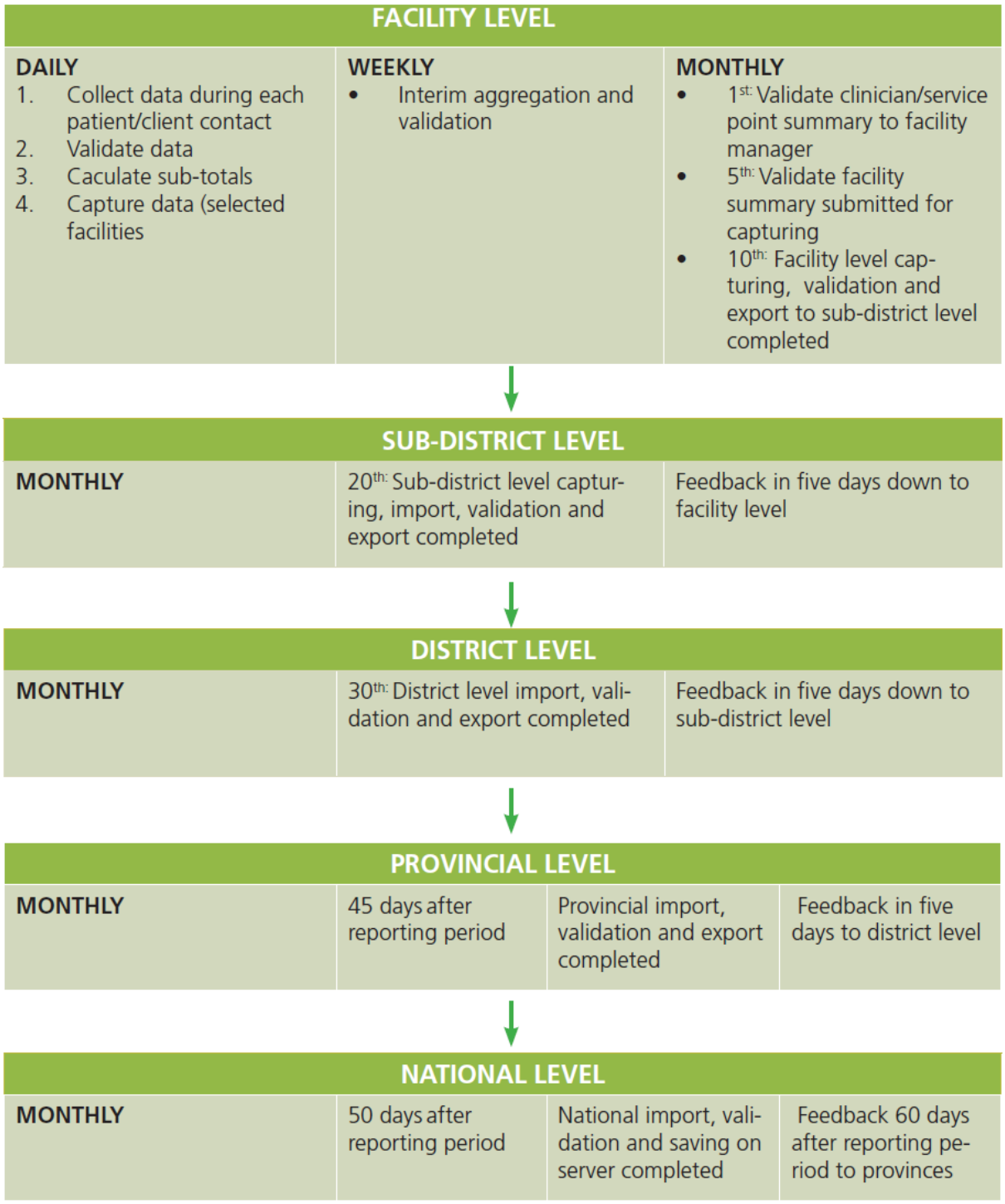


**Figure 2.3: Monthly routine data reporting flow diagram (Source: NDoH 2012a:8)**

## 2.6 EVALUATION OF ROUTINE HEALTH INFORMATION SYSTEM

Despite the importance of the RHIS, several researchers have highlighted challenges with the quality and use of the information to make evidence-based decisions in most low- and middle-income countries (Belay & Lippeveld 2013:1; USAID & MEASURE Evaluation 2019b:8). When routine data are not used, there is no platform to monitor or evaluate the quality of care; consequently, there is no improvement in service provision. Service-related challenges, like a lack of skilled HCPs, weak supply chains for drugs and equipment will be missed, resulting in poor health outcomes for communities (USAID & MEASURE Evaluation 2019b:8).

To strengthen the performance of the RHIS, MEASURE Evaluation developed the PRISM framework in 2011 to assess the reliability and timeliness of the RHIS to make evidence-based decisions. The framework facilitates the identification of gaps in the RHIS so they can be addressed, and the system can be improved (USAID & MEASURE Evaluation 2019b:8).

### 2.6.1 PRISM Framework

As stated, the PRISM framework is a modified version of the logic model, also called the ‘result-based monitoring and evaluation system model’ (PEPFAR et al 2015:23). The framework improves the performance of the RHIS through better data quality and improved information use (Belay & Lippeveld 2013:3; USAID & MEASURE Evaluation 2019b:8). It describes the various elements of the RHIS and their linkages to produce high-quality data and promote continued use of information, leading to better health system performance, better health outcomes and improved impact (Belay, Azim & Kassahun 2013:3; Belay & Lippeveld 2013:3; USAID & MEASURE Evaluation 2019a:9). The purpose of the framework is to facilitate the constant improvement of RHIS outputs or performance by assessing and analysing every element’s role. As a result, factors affecting the performance negatively are identified, and strategies are embarked on to address the shortcomings in the system (Boadu 2015:9).

According to the PRISM framework, the RHIS performance (data quality and use of information) is directly affected by RHIS processes, which are, in turn, affected by

technical, organisational and behavioural determinants. It also shows that the technical and organisational factors directly influence behavioural factors (see Figure 2.4).

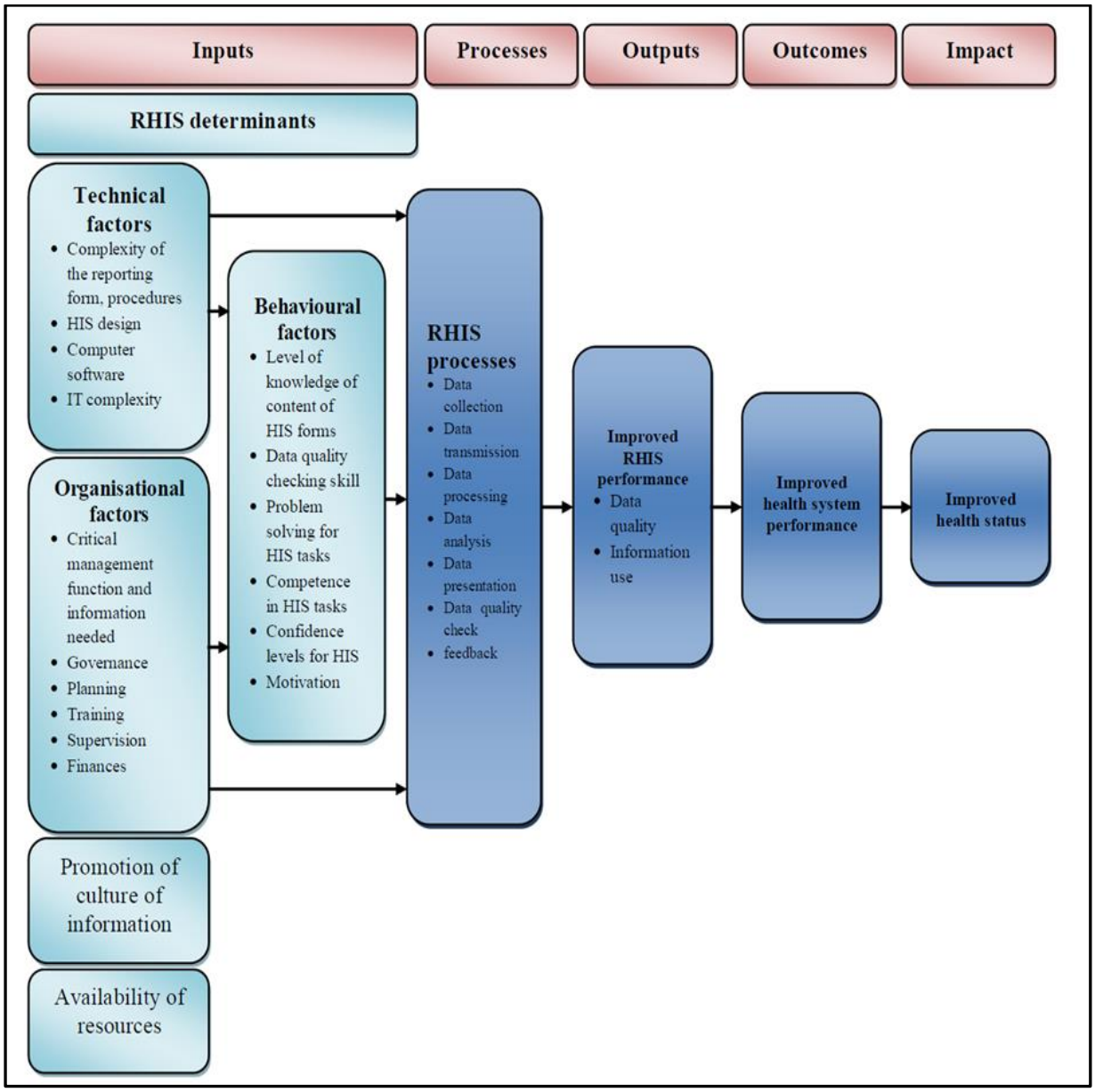


**Figure 2.4: Performance of Routine Information System Management (PRISM) Framework (USAID & MEASURE Evaluation 2019a:9)**

The evaluation of RHIS inputs focuses on routine information system determinants, which include technical, organisational and behavioural factors. The technical factors are the "know-how and the technology to develop, manage and improve the RHIS process and performance" (Teklegiorgis et al 2016:2). They include the RHIS design,

the complexity of the data reporting forms, procedures/processes, computer software and IT complexity (Kebede, Adeba & Chego 2020:5; Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019a:9). The PRISM framework acknowledges that the RHIS generators and users work in an organisational context with existing values, rules, and practices (Boadu 2015:20). The framework postulates that in an organisation, there are factors that affect the behaviour of data collectors and users, data management processes, and ultimately the performance of the RHIS. The organisational factors include critical management functions and required information, organisational governance, planning, training, supportive supervision, finance, resource availability, and an information use culture (Kebede et al 2020:5; Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019a:9).

The behavioural factors include individuals' knowledge of health information system forms, data quality checking skills, problem-solving for health information system tasks, competence in health information system tasks, confidence levels on the health information system, and the motivation for data generators and users to perform RHIS tasks (Kebede et al 2020:5; Mucee et al 2016:664; Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019b:9). The framework assumes that data generators will complete the RHIS tasks thoroughly if they understand the usefulness of routine health information, feel competent and confident in performing the RHIS tasks, and perceive the tasks as challenging but doable (Boadu 2015:20).

RHIS processes are considered to be the backbone of the system's performance. They are the main tasks involved in health information system management and include data collection, transmission, processing, analysis, presentation, quality checking and feedback (Boadu 2015:24). The role of the health information management system (HIMS) is to generate, analyse and disseminate information to allow for accountability and decision-making (Cheburet & Odhiambo-Otieno 2016b:133). The output of the RHIS is the quality of data generated and the use of information for evidence-based decision-making. Data generated through the RHIS has to be of high-quality for it to be utilised effectively.

Information use, a key output of the RHIS, refers to the analysis, synthesis, interpretation and review of data as part of decision-making (USAID & MEASURE Evaluation 2019a:29). It is expected that the information should be used at every level of the health system, starting from the point of collection. At the facility level, information is used for health facility management, such as avoiding medication stock-outs, delegating duties, and improving health facility efficiency (USAID & MEASURE Evaluation 2019a:29). The use of information is measured through the use of health information system data to generate health indicators, statistics, trends, and coverage, and for evidence-based decision-making based on the health sector's needs (USAID & MEASURE Evaluation 2019a:14).

## 2.7 RHIS PERFORMANCE

The performance of the RHIS is judged according to its ability to produce quality data that can be used for decision-making (Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019a:9).

### 2.7.1 Data quality

Statistic South Africa (StatsSA) (as cited in NDoH 2011:25), defines 'data quality' as data that are fit for use. Data quality is further viewed as a degree of agreement between data presented by an information system and data available in the real world (Manya & Nielsen 2016:115).

Data quality is key in generating reliable health information to monitor progress and decisions for continuous improvement (Yarinbab & Assefa 2018:5). Good quality data enable managers to accurately target resources to effectively manage the health system (USAID & MEASURE Evaluation 2015:38). Moreover, high data quality is deemed necessary in delivering reliable and safe health care (Ali et al 2018:11; Endriyas et al 2019:1).

Literature has identified several data quality dimensions that need to be met to declare data as high quality. The dimensions include relevancy, completeness, accuracy, consistency, understandability, representation, security, timeliness, reputation,

objectivity, precision, integrity, confidentiality, reliability and availability (Alipour & Ahmadi 2017:316; Endriyas et al 2019:2; Yourkavitch Zalisk, Prosnitz, Luhanga & Nsona 2016:1164). Table 2.1 describes each dimension.

**Table 2.1: Terms used to describe dimensions of data quality**

| Dimension | Description |
|---|---|
| Relevancy | Data are usable, applicable, useful, have perceived usefulness and importance (Alipour & Ahmadi 2017:316) |
| Completeness | Data represent the complete set of values for all eligible data fields, in terms of comprehensiveness, appropriate amounts, and adequacy (Alipour & Ahmadi 2017:316; Yourkavitch et al 2016:1164) |
| Accuracy | Data are correct, precise, free of errors, valid or believable (Alipour & Ahmadi 2017:316; Yourkavitch et al 2016:1164) |
| Consistency | Data are similar, repeatable, and comparable (Alipour & Ahmadi 2017:316) |
| Understandability | Data are interpretable, easy to understand, granular and transparent (Alipour & Ahmadi 2017:316) |
| Representational | Data are legible, the format is appropriate, there is concise and consistent representation (Alipour & Ahmadi 2017:316) |
| Security | Data access is secure, safe, and privacy is maintained (Alipour & Ahmadi 2017:316) |
| Timeliness | Data are up-to-date, current (Alipour & Ahmadi 2017:316) |
| Availability | Data are available to be reviewed (Alipour & Ahmadi 2017:316) |
| Precision | Data have sufficient detail required (Yourkavitch et al 2016:1164) |
| Integrity | No deliberate bias or manipulation for political or personal reasons (Yourkavitch et al 2016:1164) |
| Confidentiality | Data are maintained according to national and international standards for data. There is no inappropriate disclosure of personal data (Yourkavitch et al 2016:1164) |
| Reliability | The data generated by a programme's information system are based on protocols and procedures that do not change according to who is using them and when or how often they are used (Yourkavitch et al 2016:1164) |

Although there are several data quality dimensions, literature considers accuracy, completeness, timeliness and consistency as the essential elements of data quality (Kabakama et al 2016:88; Teklegiorgis et al 2016:2). Accurate, complete, and timely information is vital for public health decision-making and action-taking such as policy-making, planning, programming and monitoring (Teklegiorgis et al 2016:7). Managers require accurate, complete, and timely data to effectively plan and manage the health care system (USAID & MEASURE Evaluation 2015:38).

Despite the importance of data quality, the performance of the RHIS in South Africa and other low-income countries was found to be below expectation. Consequently, it was determined that the RHIS is not used to generate accurate and reliable data as expected (Kabakama 2016:85; Nicol, Dudley & Bradshaw 2016:61; Teklegiorgis et al 2016:2). Several studies in African countries have highlighted a relationship between data quality and data use, and suggested that poor-quality data are useless and should be discarded (Singh, Goel, Behera & Punia 2016:12). It is further suggested that for consistent information use to occur, data should be of high quality so that data users are confident that the data they are using is accurate, complete, and timely (Ndegwa 2015:44). The commonly reported factors that compromise data quality include incomplete data due to missing elements and data sets, inaccurate data, under-reporting and untimely reporting, and the unavailability of data when required (Kabakama et al 2016:85).

#### 2.7.1.1 Data completeness

Data completeness at the district and provincial level is measured by comparing the number of all facilities reported, including the private sector and parastatals, against the number of facilities required to report. All reporting facilities should also transmit all reports as expected. The reports should be fully completed with the required information (Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2015:39).

Data completeness is measured at the facility level by comparing the proportion of data recorded in the forms against the required data (Deepa & Gopinath 2017:16). All data elements for the service provided should be filled in and reported at all times to the administrative area (Teklegiorgis et al 2016:2). If the service was not provided for the specific month, a zero should be recorded instead of the cell being left blank, which could be mistaken for a missing value (USAID & MEASURE Evaluation 2015:39).

Evidence from literature revealed variations in data completeness at the facility levels. Incomplete data were prevalent in low- and middle-income countries, irrespective of the importance of data completeness to measure health programmes' coverage (Ouedraogo, Kurji, Abebe, Labonte, Morankar, Bedru, et a. 2019:8). Studies conducted in Tanzania and Pakistan found 62% and 58% of data completeness in the

facility records, respectively (Ali et al 2018:8; Kabakama et al 2016:88). Meanwhile, in India, Deepa and Gopinaths (2017:16) found that 84.9% of reproductive and child health service data reports were incomplete. Similarly, in Benin, a high level of data incompleteness was found on data that were grouped into a 'lot' (referred to as "a set of data generated by a single HCP") 12 months before their study. The HCP processes data for several reports, including curative, maternity and immunisation reports. From the 'lot' (data), all data were subjected to the same threshold of 20% and 40%. Different sets of data generated by each HCP were thus assessed according to the threshold, to deem the data complete. It was found that 88.8% and 81% of reports were more than 20% and 40% incomplete, respectively (Ahanhanzo, Quendo, Kpozèhouen, Makoutodé & Dramaix-Wilmet 2015:840).

Data completeness at the facility level appeared to be better in Ethiopia, South Africa and Uganda. A recent study conducted in Ethiopia, Oromia Regional State, reported that the morbidity data report and service registration book were 86% and 78.2% complete, respectively (Kebede et al 2020:6). However, although the overall data completeness was 86%, it was reported to be far less than the national target (Kebede et al 2020:7). Similarly, another study in the same region of Ethiopia found 78.2% of data completeness in the service registration book (Yarinbab & Assefa 2018:7).

Nicol et al (2016:62) conducted a study assessing the quality of routine data for the prevention of mother-to-child transmission of HIV in South Africa. They found variation in data completeness when applying different tolerance levels to account for extreme errors in data sets. The tolerance levels of 0%, ±10% and ±20% were set according to the permissible variation range from the expected performance and the actual performance, with 0% representing no variation. Data completeness at the facility level was 91%, 96% and 98% at 0%, ±10% and ±20% tolerance levels, respectively. In Uganda, immunisation data were found to be 100% complete from January to June 2015; completeness was reduced during July to November 2015, but remained above 90% (Nsubuga, Luzze, Ampeire, Kasasa, Toliva & Riolexus 2018:4).

The variation of data completeness was also evident among districts in Ethiopia. In a study assessing the quality of HMIS data for maternal and child health in Ethiopia, Jimma Zone, Ouedraogo et al (2019:6) found that the completeness of reports

received by the district health offices varied per district. Gomma district received 76% of reports, followed by 49% in Seka Chekorsa, and 33% in Kersa. Concerning the content completeness of the reports, Innocent, Anguyo, Onzima, Katongole and Govule (2016:8) determined that in Rwanda, 98% of reports in Bugesera, 96.6% in Kayonza and 98.3% in Rwamagana districts were more than 95% complete. Moreover, in their study reporting on the practices and data quality in health information systems in Kenya, Manya and Nielsen (2016:121) found that 92%, 91%, 82.8% and 81.3% of data completeness in Kisumi, Siaya, Aasin Gishu and Busia country, respectively; the average data completeness was therefore 86.9% (Manya & Nielsen 2016:120).

In Gauteng Province, South Arica, the department of health, in collaboration with PEPFAR, USAID and MEASURE Evaluation SIFSA, conducted a data quality assessment in 76% (n=287) of primary health care facilities in the province. The assessment followed the rationalisation of primary health care registers being used as a measure to reduce the number of registers used at the facilities. Data completeness was assessed by comparing data on registers with data extracted from the DHIS software. Several data elements were assessed, including primary health care headcount; maternal, child and women's health; TB, HIV and AIDS treatment; diabetes and hypertension treatment. The findings were varied among the data elements that were assessed, ranging from 5% to 96% of facilities with missing data. The lowest missing data was on the primary health care headcount data element, where only 5% of facilities had missing data. In comparison, the highest was on infant polymerase chain reaction testing positive around six weeks; 96% of facilities reflected missing data (GP DoH, PEPFA, USAID & MEASURE Evaluation SIFSA 2016:42). Ultimately, incomplete data were found to be a barrier to the use of information in planning health services (Afe et al 2018:218).

#### 2.7.1.2 Data accuracy

Data accuracy refers to data correctly reflecting community health status and health services (Teklegiorgis et al 2016:2). It is further described as the degree to which the data correctly describes the real world or the event under investigation. Furthermore, data accuracy is considered to be a vital data quality dimension that assists the user

to develop trust in data representativeness (Ali et al 2018:8). It is measured by assessing the correspondence between data on electronic sources (e.g. DHIS software) and data from other source documents, including patients' files, registers and tally sheets (Teklegiorgis et al 2016:2).

Studies conducted in many developing countries have reflected inconsistencies in data accuracy. Main data quality challenges were related to variations within the source document and the reports. In their study assessing the quality and use of routine health care data in Rwanda, Innocent et al (2016:8) found that 73.3% of facilities accurately transmitted data from registers to monthly reports, while 70.6% accurately transmitted data from monthly reports to the electronic database. In Tanzania, data discrepancies from outpatient records ranged from 33.9% to 62% (Kabakama et al. 2016:88), and in Ethiopia, the data accuracy level of reports was 48% (Yarinbab & Assefa 2018:7).

An alarming rate of inaccuracy was reported in Benin, where 98.3 and 92% of a 'lot' (set of data generated by a single HCP) were more than 20% and 40% inaccurate, respectively (Ahanhanzo et al 2015:840). In Ethiopia, only 48% of the 'six months health facility service delivery' reports were accurate; about 36% of health facilities over-reported and 16% underreported (Kebede et al 2020:7). Similarly, in Uganda, Nsubuga et al (2018:4) found that 27% of the health centres over-reported, while 4% underreported. An over-reporting of 24% was found on the 'fourth antenatal visit' element, 21% on 'postnatal visit', and 16% on 'fully immunised children'; also, an under-reporting of 28% was found on 'total malaria cases' in Ethiopia (Endriyas et al 2019:3). Furthermore, over-reporting was found in Kenya, where discrepancies between paper registers and the District Health Information System 2 (DHIS2), a web-based DHIS, were found on two indicators; there were 19% and 49% discrepancies between paper records and the electronic database (DHIS2) on children under five being treated for malaria, and children being fully immunised, respectively (Manya & Nielsen 2016:122).

Most data accuracy challenges are found in paper-based records, and Ali et al (2018:8), in their study comparing data quality among the paper-based records and digital records, found 77% data accuracy in digital records as compared to 23% on

paper-based records. In the study assessing the quality of routine data on the prevention of mother-to-child transmission of HIV in South Africa, Nicol et al (2016:62) measured data accuracy using a scale which ranged between 0% to 20% precision and tolerance level. They reported an accuracy level of 51%, 65% and 73% on 0%, 10% and 20% accuracy tolerance levels, respectively. The accuracy level was low when no variations were tolerated (0%) among records. Correspondingly, only about 50% of facilities in Ethiopia were found to be within 10% precision of accuracy on some data elements that were assessed (Endriyas et al 2019:3). Among others, workload, not recording, inadequate supervision, manipulation of data for competition, lack of competency, lack of commitment, and lack of tools were cited as the reasons for variations in data (Endriyas et al 2019:4).

#### 2.7.1.3 Timeliness

The timeliness of routine health information refers to data that are reported on time as per the national standards. It is measured as the submission of the reports by an accepted deadline (Teklegiorgis et al 2016:2). Timely reporting is essential in planning, monitoring, and evaluating programme performance and subsequent interventions (Nsubuga et al 2018:7). Despite the importance of timely reporting, several studies have revealed the late submission of reports ranging from 30% to 75%. The highest level of late submission was reported in Tanzania, where 60% of reports were submitted late to the administrative level (Kabakama et al 2016:88). Similarly, in Ethiopia, Jimma Zone, the timeliness of reports was low in Kersa district (32.8%), followed by Seka Chekorsa (49.5%), and Gomma (79.9%) (Ouedraogo et al 2019:6).

In their study, Manya and Nielsen (2016:121) found that 78.7% of facilities in Kenya reported on or before the due date. A similar reporting timeliness was also reported in Ethiopia, East Wollega Zone, where 70%, 66.6% and 80% of reports from health posts, health centres and health offices respectively arrived on time at the next reporting level. The average timeliness on all levels was 70% (Yarinbab & Assefa 2018:7). Elsewhere in Ethiopia, East Wollega Zone, the timeliness of reports for health posts, health centres, and district health offices to the next respective level of the health system was 70%, 66.7%, and 80%, respectively. The overall timeliness was 70% (Kebede et al 2020:6).

A higher level of reporting timeliness was reported in Rwanda, where 90.9% and 96.6% of facilities reporting at two different hospitals had reported on time. The overall timeliness of HMIS monthly reports stood at 93.8% (Innocent et al 2016:8). Similarly, in Uganda, the timeliness of reports from January to June 2015 was 100%. However, it declined between July and November 2015 but remained above 60%, although the submission dates were known by 90% of HCPs (Nsubuga et al 2018:4).

Late health data reporting was thus identified as a barrier to health data management in low- and middle-income countries (Akhlaq, Mckinstry, Muhammad & Sheikh 2016:1319). Moreover, late reporting jeopardises the programme planning and monitoring process, consequently impeding the programme's performance (Nsubuga et al 2018:8).

### 2.7.2 Use of information

Several researchers assessed the use of routine health information for evidence-based decision-making and revealed different practices in the use of RHI. The use of RHI for compiling reports without any decisions or plans based on the report was evident. In a study assessing the determinants and the performance of RHIS in Palestine, Mimi (2015:139) found 100% health service reports at the ministerial level, 50.6% at the district level, and 84.3% at the facility level. However, there were no reports reflecting decisions taken based on the information from the health service reports at all levels. Correspondingly, in South Africa, Nicol, Bradshaw, Uwimana-Nicol and Dudley (2017:28) found that 98% of assessed facilities had RHIS reports, but only 50% used the information in these reports for decision-making and planning purposes.

In their data quality assessment project, the Gauteng Department of Health, in collaboration with partners, found that 85.3% of facilities had copies of monthly reports (GP DoH et al 2016:91) and Gauteng facilities were reported to be sharing information in meetings. Evidence of discussions regarding data quality issues like timeliness, completeness and accuracy was observed in 84% of facilities (GP DoH et al 2016:85).

Similarly, Abera et al (2016:103) found that 99.1% of health units in Ethiopia sent their reports to the district health office and 92.6% of them presented and discussed the

information with facility management and communities. Discussions on the RHI were also found in Southern Ethiopia, where 54% of HCPs reported having discussed the monthly performance progress using standard health indicators. However, only 40% of facilities had evidence of discussions, as reflected on the performance review teams' meeting minutes (Wude, Woldie, Melese, Lolaso & Balcha 2020:5). The sharing of RHI and the frequency of meetings thus appeared to be inconsistent. Cheburet and Odhiambo-Otieno (2016a:207) found that only 46% of HCPs shared data in the meeting, and of these, 15% held monthly meetings, 14% quarterly, and 17% annually. Despite the inconsistencies in data sharing, 15% of HCPs acknowledged the importance of data collection and sharing to "generate information to address data quality on time".

Feedback as a form of information sharing is an essential component of any reporting system to improve the service and utilisation of information systems. HCPs who obtain regular feedback on their report might receive constructive and relevant advice to utilise their data for improving their service delivery (Shiferaw et al 2017:7). However, most HCPs in developing countries simply report routine health data without adequate utilisation and feedback. HCPs and managers at lower levels of the health care system therefore have a minimum understanding of the benefits of information due to a lack of feedback (Dagnew et al 2018:2).

A similar trend of a lack of RHI feedback to the lower level was evident in several studies. In Ethiopia, more than half (53.5%) of sampled respondents did not receive any regular feedback from the next higher health authority (Shiferaw et al 2017:4). Similarly, Wude et al (2020:5) found that even though some (46.7%; n=224) HCPs received some feedback, few (45.2%, n=100) received feedback for every report sent to the higher level. Also, only 40% of facilities had evidence of feedback on RHI use, showing the system's strengths and weaknesses. Slightly more than half (53.8%) of HCPs in Ethiopia received feedback on routine health information utilisation (Dagnew et al 2018:4).

In contrast, in a study on the utilisation of HIMS and associated factors in Southern Ethiopia, Abera et al (2016:103) found that a majority (87.4%) of units/departments had received feedback from the district health office on a monthly, quarterly and

annual basis. Similarly, 80.8% of facilities in South Africa had quarterly feedback from the district or sub-district offices (GP DoH et al 2016:91). Regular feedback was found to be one of the most promising facilitators for health information exchange in low- and middle-income countries (Akhlaq et al 2016:1319). In addition, useful feedback offers essential guidance and provides attainable recommendations for courses of action. Useful feedback also validates data collection and reporting, demonstrates that someone is tracking progress, and conveys the importance of RHI (Moses, Kaunda & Azeron 2019:18). Moreover, regular feedback was associated with good RHIS utilisation in Ethiopia (Shiferaw et al 2017:6).

The manner in which feedback is provided and information is presented is quite crucial in enabling the correct interpretation of RHI. Cheburet and Odhiambo-Otieno (2016b:137) assert that data require the right format for presentation, communication, and sharing to help users understand the key issues. Therefore, providing summaries of the data, interpreting key findings, and presenting complex information in simple charts and maps will help users identify key priorities to be addressed. Health information officers at the district level are expected to provide feedback through pivot tables and updated graphs on selected indicators for display in the facility (NDoH 2012a:16).

However, studies conducted in Ethiopia and South Africa found that only 56.7% and 60% of facilities displayed the relevant RHI, respectively (Wude et al 2020:5; Nicol et al 2017:28). Although Nicol et al (2017:28) found that only half of the facilities displayed updated information, others displayed information that was more than six months old. Old information distorts the current situation at the facility and may hamper the planning of daily operations. The display of updated information is helpful for the service users, HCPs and managers to understand and keep their performance status in mind in their day-to-day activities (Abera et al 2016:107).

In addition to information display, RHI is interpreted and used in developing plans and interventions that will optimise patient care and facility performance (NDoH 2012a:18). In three states of Nigeria (Akwa-Ibom, Cross River and Niger), data were used in managing programme performance in terms of setting and monitoring targets, and for supply chain management in terms of forecasting and minimising stock-outs (Ohiri et

al 2016:325). Correspondingly, in Botswana, RHI was used in planning and decision-making about programmes and services, and developing district health plans. The RHI was also used to order medications and supplies, but only a few district managers in Botswana felt that RHI was used to influence staff and budget allocation (Seitio-Kgokgwe et al 2016:8).

Unlike Ohiri et al (2016:325) and Seitio-Kgokgwe et al (2016:4), Dagnew et al (2018:4) found that RHI was comprehensively utilised at the health facilities of Ethiopia. The majority of HCPs used information in treating patients (94%), disease prioritisation (90.1%), drug procurement (85%), monitoring day-to-day health service activities (89.6%), checking data quality (92.6%), resource allocation (86.7%), planning (89%), department performance evaluation (88%), evaluation of staff performance (86.5%), selection of best experience within a health facility (85%), sharing health data to other facilities and stakeholders (82.8%), decision-making (87.8%), and for community mobilisation and discussion (87.1%) (Dagnew et al 2018:4).

It was also reported that the use of RHI varied among health services. A study assessing RHIS utilisation and associated factors in Ethiopia reported better utilisation at the clinics (51%) as compared to health posts (42%) and hospitals (38.5%) (Shiferaw et al 2017:4). In some facilities of Kenya, the majority of HCPs reported the lack of HIM action plans; only 6% indicated that HIM action plans were available (Cheburet & Odhiambo-Otieno 2016a:206). In the same vein, Nicol et al (2017:35) found that in South Africa, RHI was not used for decision-making and planning purposes, but the reporting and monitoring of programme outputs. Budget allocations were also deemed to be guided by politics rather than evidence from RHI because they are considered unreliable (Muhindo et al 2016:3). Consequently, budgets are allocated to health facilities according to the national strategic plan, which at times does not reflect the real situation on the ground in terms of data (Muhindo et al 2016:3).

## 2.8 FACTORS INFLUENCING DATA QUALITY AND USE OF INFORMATION

Data management processes that include data collection, collation, processing, analysis and reporting in developing countries have been faced with many challenges. Subsequently, the produced data are of poor quality and cannot be utilised for

decision-making (Cheburet & Odhiambo-Otieno 2016a:201). Moreover, several elements influencing data quality and the use of information have been identified. These elements are classified into three factors or determinants of data quality and use of information, namely technical, organisational, and behavioural determinants (USAID & MEASURE Evaluation 2017:24).

### 2.8.1 Technical factors

HIM technical factors are related to procedures and information technology to develop and manage the RHIS (Mucee et al 2016:662; Teklegiorgis et al 2016:2). The development of indicators, RHIS procedures, RHIS designs, the design of registers and data collection tools were reflected as the most critical aspects in the technical management of the system (Mucee et al 2016:662; Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019a:10).

Technical indicators provide a simple and reliable measure for programme performance and guide the type of data required to measure performance and defined needs in order to generate accurate information (USAID & MEASURE Evaluation 2015:6; PEPFAR et al 2014:31). However, a study conducted in Malawi found that only 43% of health centres had written indicator definitions for antenatal care, family planning, HIV testing and counselling, acute respiratory infection available in a facility or district health office (O'Hagan et al 2017:374). Similarly, in Ethiopia, just more than half (57.7%) of HCPs had standardised health indicators in their offices (Wude et al 2020:5).

In contrast, a higher percentage (84.5%) of health units in Ethiopia had data collection standards and case definitions (Abera et al 2016:103). Similarly, a NIDS and data element definitions were found in 79% of facilities in South Africa (GP DoH et al 2016:91). The availability of indicator definitions also appears to improve the use of information. Dagnew et al (2018:8) and Wude et al (2020:6) respectively found three times (AOR = 3.28) and two times (AOR = 2.05) higher odds of participants using information among those who had standard indicator definitions than their counterparts in Ethiopia.

In addition to indicators, Chen, Yu, Hailey and Cui (2019:5) consider a data collection tool to be a core component of the data collection system. The authors further allude that data collection tools need to be structured, standardised, and the format should be simple enough to generate accurate data. However, previous studies in Pakistan and Nigeria found that data collection tools were not well designed. The tools were complex, large and had unnecessary columns (Adejumo 2017:47; USAID & MEASURE Evaluation 2018a:22). Chen et al (2019:5) thus posit that a poorly designed data collection tool could impair data accuracy. Similarly, non-user-friendly tools are not efficient in producing information that is needed for decision-making (Mucee et al 2016:669).

In contrast, 93% of data collection tools and 80% of health information system software were reported to be user-friendly by health information users in Palestine. Eighty per cent of them asserted that the information produced by the system provides a comprehensive picture of the health system. However, it was found that the system did not calculate the indicators for the facility catchment population and did not produce reports for the district. No comparisons in achievements of the facility, district and national targets could be made through the system (Mimi 2015:140).

In Pakistan, Anwar et al (2015:6) found that 25% of the data collection tools and registers were outdated, meaning they were no longer relevant. In addition, studies conducted in Kenya and Rwanda reported that health care facilities were using multiple data collection tools. This phenomenon created duplication of data, which negatively affected the quality of data and the utilisation (Mucee et al 2016:667; Innocent et al 2016:10).

Standardised data collection and reporting tools were found to be the most important facilitators for data quality and health information exchange in low- and middle-income countries (Akhlaq et al 2016:1319; Ndegwa, 2015:43). Correspondingly, in 2015 and 2016, South Africa implemented the rationalisation routine of data collection tools. The rationalisation reduced the number of data collection tools from 54 to six, thereby reducing data duplication. The data collection and collation tools were standardised to improve the accuracy and the timeliness of data (Gray & Vawda 2015:39).

### 2.8.2 Organisational factors

Organisational factors are aspect within the organisation that support or hinder the data management process (Mucee et al 2016:663). These factors are essential management functions and include governance, planning, training, supervision, resource availability, and the promotion of a culture of information use (USAID & MEASURE Evaluation 2019a:9; Teklegiorgis et al 2016:2).

#### 2.8.2.1 Governance

Good governance of the RHIS is reflected by the organisational commitment to supporting the production of high-quality data and the use of information. Organisational commitment is shown by the availability and compliance to the HIM policy, SOPs and guidelines. It is further noted that compliance to guidelines requires good leadership that role model the culture of information use and provide guidance and support measures to enforce the culture (Cheburet & Odhiambo-Otieno 2016a:202).

A HIM policy is crucial for effective data management because it defines “priorities and provides a guiding framework within which all stakeholders operate” (Seitio-Kgokgwe, Gauld, Hill & Barnett 2015:4). However, a study conducted in Ethiopia found that 63.6% of health facilities did not have a policy for information use (Teklegiorgis et al 2016:6). Such a lack of policy creates an inefficiency in the health information system because various stakeholders’ roles and responsibilities in data management remain unclear (Seitio-Kgokgwe et al 2015:7).

A lack of guidelines and procedure manuals for data management was also found in Sudan and Malawi (Moses et al 2019:16; O’Hagan et al 2017:3740). The majority of facilities in Sudan did not have guidelines for data collection, analysis and the interpretation of family planning data (Moses et al 2019:13). This suggests that no procedure was followed for data collection, including the use of specific data collection tools, following standard definitions, and the calculation of indicators (Moses et al 2019:16). Similarly, only 34% of facilities in Malawi had reporting guidelines indicating

the data to be reported, the unit to report to, and the due date (O'Hagan et al 2017:374).

Less than half (39.5%) of HCPs in Kenya reported the availability of a SOP in their units. Although the SOP was available, it was not easily accessible to all because there was only one SOP for all staff members in a unit. The SOP also did not improve data quality because it did not comprehensively address data quality (Cheburet & Odhiambo-Otieno 2016a:205). In contrast, a study conducted in Gauteng, South Africa, found that 83.9% of facilities had the DHMIS policy in place and 82.9% of the facilities had a DHMIS SOP in place. The facilities were utilising both the policy and the SOP (GP DoH et al 2016:91). The SOP guided the data management process, including reporting to the district and feedback from the district. The process is intended to produce quality information that can be used in monthly performance reviews and planning (Scott & Gilson 2017:6).

#### 2.8.2.2 Supportive supervision

Regular supportive supervision accompanied by feedback was considered to be a critical factor in providing a mechanism for strengthening data quality (Cheburet & Odhiambo 2016a:203). A growing body of literature has investigated the implementation of supportive supervision in RHIS and found some variations in supervision frequency. In a hospital in Kenya, 79% of HCPs received supportive supervision, while 22% did not receive any form of supervision. Of those who were supervised, 30% were supervised yearly, 33% quarterly, and 15% monthly. The lack of supportive supervision was considered to negatively affect the perceived importance of data quality (Cheburet & Odhiambo 2016a:203).

Studies conducted in Ethiopia reported that 77.7% of health units in Southern Ethiopia and 57.6% in Northwest Ethiopia had received supervision on routine health information (Abera et al 2016:103; Dagnew et al 2018:4). However, Wude et al (2020:5) found that less than half (46.9%) of HCPs in Southern Ethiopia were supervised on a RHIS; of the 46.9%, 82.2% were supervised either every month or quarterly. Furthermore, Teklegiorgis et al (2016:7) claim that 69% of health units in

Eastern Ethiopia had received supervisor directives to check data accuracy, to enter complete information on the data collection tools, and submit monthly reports on time.

A low level of supervision was reported in Northwest Ethiopia, where only 31.8% of HCPs were supervised. About half (53.3%) of the supervised group received supervision bi-annually, although 53.5% did not receive feedback from a higher authority on a regular basis. Moreover, the feedback was better at health posts (51.8%) and health centres (45.5%) compared to hospitals (40.8%) (Shiferaw et al 2017:4). A profoundly low level of supervision was also reported in Palestine, where the supervision level was 2% at the district level and 1.3% at the facility level (Mimi 2015:149).

A lack of regular supervision was found to affect the quality of data negatively (Cheburet & Odhiambo 2016a:205; Singh et al 2016:13). Mucee et al (2016:669) allude that inadequate supportive supervision at the facility level results in a lack of verification data at the point of collection, resulting in poor-quality data. Inadequate supportive supervision is an organisational constraint that influences the use of information negatively, particularly in the public health sector (Mucee et al 2016:669).

Shiferaw et al (2017:6) reported higher odds on the utilisation of routine health information among HCPs who received supportive supervision (AOR=2.60, 95% CI: 1.42, 4.75). Similarly, higher odds of information utilisation were found among HCPs who received supervision in Oromia regional state of Ethiopia (AOR: 2.460 CI 95% 1.101,5.493) and Southern Ethiopia [AOR = 2.34; 95% CI: (1.4–3.92)] as compared to their counterparts who received no supervision (Kebede et al 2020:7; Wude et al 2020:6).

Regular supportive supervision was found to be a facilitator for health information exchange in low- and middle-income countries (Akhlaq et al 2016:1319) and play an essential role in motivating HCPs, identifying discrepancies, and improving the performance of HCPs (Wude et al 2020:5).

#### 2.8.2.3 Training

According to Adaletey (2015:23), capacity building in the form of training and continuous education to improve skills and competencies on the use of RHIS is fundamental to the success of the system. Anwar et al (2015:5) further assert that training HCPs, including facility managers, is imperative because the production of accurate and reliable health information is the core objective of the health information system. Its achievement depends on data collectors and managers.

Literature has linked HIMS training with good utilisation of health information. Shiferaw et al (2017:4) and Wude et al (2020:6) reported two times (AOR=2.72; 95% CI: 1.60, 2.46) and eight-times [AOR = 8.12; 95% CI: (4.33–15.23)] higher odds of good utilisation of information among trained HCPs as compared to those who were not trained, respectively.

Despite the importance of training in data management, several researchers revealed challenges with HCPs' training. In Ethiopia's Oromia Regional State, about 38.3% of respondents reported that they were trained on HMIS data quality and information use tasks in the past six months (Yarinbab & Assefa 2018:9). In the same state, Kebede et al (2020:6) found that the overall training status for the basic health management information system was 36.4%. Also, in Southern Ethiopia, 64.8% of HCPs were not trained on RHISs (Wude et al 2020:5).

The training status was even lower in Kenya, where only 22% of HCPs were trained or retrained in routine HIM systems in the last 12 months (Cheburet & Odhiambo-Otieno 2016a:206). In the same institution, only a quarter (25%) of HCPs had been orientated on the health information SOP. It appeared that orientation to the SOP was only provided to those at the management level, and no formal training was provided on policies and SOPs for operational staff (Cheburet & Odhiambo-Otieno 2016a:205). In the same setting, it was found that 4% and 47% of HCPs acquired knowledge of HIM processes from comprehensive training and workshops, respectively, while 33% acquired knowledge about HIM processes from co-workers and 16% was self-taught (Cheburet & Odhiambo-Otieno 2016b:133). Regardless of how the HIM knowledge was acquired, 96% of HCPs collected data daily, while 91% collate the data collected.

It was found that 5% of data collectors did not collate their data. This was a concern because data should be collated at the point of data collection and aggregated before being released to other users (Cheburet & Odhiambo-Otieno, 2016b:134).

Concerning the training conducted in Northwest Ethiopia, Shiferaw et al (2017:4) reported that the knowledge and skills covered in training were not the same for all HCPs. Although 46.8% of HCPs were trained in HIMS, only 7.6% were trained on basic computer skills, and 5% were trained on data analysis. The finding implies that some HCPs could not analyse data because they were not trained. Akhlaq et al's (2016:1321) suggest that trained HCPs would use data analysis skills and tools to manage data and improve the quality of data for decision-making.

Compared to the Oromia Regional State of Ethiopia and Northwest Ethiopia, the status of training in Eastern Ethiopia was better. The majority (75%) of health units in Eastern Ethiopia had staff members who were trained and capable of performing health information system tasks (Teklegiorgis et al 2016:7). Correspondingly, in Pakistan, facility managers' training on HIM ranged from 80% to 90% in nine districts, with only one district at 53% (Anwar et al 2015:5).

In South African, it was found that 72% of personnel responsible for data management received a high level of DHIS training, 16% received a low-to-moderate level of DHIS training, while 12% were not trained on DHIS at all. Regarding training on the DHMIS policy and DHMIS SOP, it was reported that 50% of personnel responsible for data management received high-level training, 24% received low-to-moderate training, while 26% were not trained at all. Furthermore, 47% and 24% of personnel received high-level training and low-to-moderate training on the NIDS or PIDS respectively, while 29% were not trained (GP DoH et al 2016:75).

#### 2.8.2.4 Availability of resources

Literature present that in developing countries, resources required for data management processes has been a challenge, resulting in low utilisation of the health information system. In a study conducted in Ethiopia, 93.4% of health department units did not have data analysis equipment like computers. Also, of those facilities with

computers, only 5.7% had printers, and 0.8% had access to the internet (Shiferaw et al 2017:4). The lack of computers for data capturing was also reported in Kenya and Botswana, leading to inefficiency in producing the information needed for decision-making (Mucee et al 2016:669; Seitio-Kgokgwe et al 2016:5).

On the contrary, the availability of computers in Gauteng Province, South Africa, was reported to be high. The majority (99%) of facilities had at least one computer, while only three (1%) facilities did not have any computer to capture data. Most (81%) of the computers were functional; only 9% were not fully functional due to technical issues, while 3% were not functional at all. Half of the facilities with only one computer which was not fully functional obtained less than 75% on their data quality score, with three facilities obtaining less than 30% on the data quality score. It thus appears that the functionality of computers affects the quality of data (GP DoH et al 2016:63).

Studies in Botswana and South Africa also highlighted challenges with human resources. Although HCPs in Botswana were aware of their HIM responsibilities, they recognised their inability in undertaking these responsibilities due to a shortage of staff (Seitio-Kgokgwe et al 2016:7). In Gauteng Province, South Africa, it was determined that 20 health care facilities had no data capturers or dedicated administrative personnel, leading to late capturing of data, subsequently causing late reporting of data to the next level. The majority (16) of these facilities were from the Tshwane district (GP DoH et al 2016:71).

Finally, Yourkavitch et al (2016:1168) found that staff members in Malawi were using outdated tools and disorganised or loose forms to collect data because there was a shortage of data collection tools. Similarly, 32% of primary health care facilities in Gauteng ran out of primary health care data collection tools, known as MDS tools, for one month, while 11% ran out of the tools for two consecutive months. Despite the shortage of MDS tools, 12% of facilities ran out of programme-related data collection tools, specifically tuberculosis registers. The shortage of tools was attributed to changes from old to new tools, which took place at the same time (GP DoH et al 2016:93-94). The shortages of data collection tools were found to have a negative impact on the accuracy of data and reporting timelines (Wandera et al 2018:22; Yourkavitch et al 2016:1168).

### 2.8.3 Behavioural factors

Behavioural factors are individual factors affecting the performance of HIM tasks, including knowledge and skills, confidence, motivation, and attitude (Mucee et al 2016:664; Teklegiorgis et al 2016:2). Several studies highlighted a lack of competencies (knowledge and skills) in data management as the common cause for poor-quality data and non-use of information (Mucee et al 2016:662; Nicol et al 2017:35; Singh et al 2016:13). In Palestine, the staff at the facility level (32.9%) had lower knowledge on the rationale for collecting data on diseases, immunisation and the population as compared to staff at the district (47%) and ministry (67%) level (Mimi 2015:147).

Dagnew et al (2018:4) found that 75% of HCPs in Ethiopia had no knowledge about national indicators, 70.1% had no data analysis skills, and 99.8% had no professional skills in utilising routine health information. Correspondingly, in South Africa, Nicol et al (2017:34) found that a lack of data collection skills, which include a lack of understanding the definitions for data elements and indicator definitions, and a lack of numeracy skills, contributed to the poor recording of data and affected the quality of data negatively. Furthermore, the staff at the facility and district level lacked data validation and analysis skills, which compromised data quality (Nicol et al 2017:34). Health information was not utilised effectively because the HCPs lacked skills in terms of interpreting and using information (Nicol et al 2017:35).

Competence in understanding and interpreting data was considered an enabler for using routine health information for decision-making (Wude et al 2020:9). A study conducted in Palestine found a difference between HCPs' perceived competence in data management tasks and actual competence. The majority (77%, 78.4%, 85.4% and 83.4%) of HCPs perceived that they were capable of checking data quality, calculating indicators, plotting data by months, interpreting data, using data to identify gaps and making decisions respectively (Mimi 2015:142). However, when they were assessed for competency in checking data quality, calculating indicators, plotting data, interpreting the graph and using the information, they obtained an average score of 45.8%, 52%, 48.3%, 42% and 51.2%, respectively (Mimi 2015:144).

In addition to competencies, literature revealed that HCPs' attitude and motivation towards data management affect the quality of data and use of information (Kumwenda, Kunyenje, Gama, Chinkonde, Martinson, Hoffman et al 2017:308; Nicol et al 2017:33; Shaikh, Khan, Kumar, Khushk, Hamid & Hafeez 2015:30). In South Africa, it was reported that some HCPs refuse to comply with the guidelines and collect data incorrectly (Nicol et al 2017:33). HCPs with a negative attitude towards data management were not performing the data management task appropriately, thus affecting the programme's overall performance (Kumwenda et al 2017:309; Nicol et al 2017:33; Shaikh et al 2015:31).

HCPs in Palestine were also deemed to be unmotivated (motivation score of 49.3%) to perform routine health information activities. Their level of motivation was influenced by the perception that data management processes were boring and a waste of time (Mimi 2015:147). Muhindo et al (2016:3) found that most HCPs considered themselves care providers; therefore, they felt they had no business in data collection. Similarly, 71.4% of HCPs in Malawi viewed data information management tasks as time-consuming, exhausting and tedious. The HCPs considered data management as secondary to the clinical service (Kumwenda et al 2017:308). The view of data management as an extra burden by HCPs and some managers in South Africa resulted in under-utilisation of information generated from the DHIS (MEASURE Evaluation 2015).

## 2.9 SUMMARY

The literature review identified specific components of the health information system, including the HMIS and the RHIS. The importance of health information in the health care system and the data management process was highlighted, particularly reproductive health data management. Moreover, the relationship between data quality and the use of information for decision-making was also reflected. Factors influencing the performance of the RHIS (data quality and use of information) were also described in the literature. The review provided the researcher with insights on how to use the PRISM framework to evaluate the performance of RHIS.

Chapter 3 presents the research design and methods employed in this study.

# CHAPTER 3
# RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

The research methodology describes how the research was carried out to answer the research question (Brink et al 2018:187). This chapter discusses the research design and methods employed in the study, which include the study population, sample and sampling, data collection and analysis, validity and reliability, trustworthiness and the ethical considerations of the study.

## 3.2 RESEARCH PURPOSE AND OBJECTIVE

### 3.2.1 The purpose of the study

The study's purpose was to evaluate the performance of RHIS using DHIS in generating quality reproductive health information (couple year protection) in the Tshwane district, with particular focus on the factors involved in data management processes and the use of information in decision-making. The ultimate aim was to develop strategies to improve the management of routine reproductive health data, thereby improving the quality and the use of information for decision-making.

### 3.2.2 Research objectives

The objectives of the study were to:

*Phase 1*

- Determine how the RHIS is used to produce reliable and quality routine reproductive health data.
    - Sub-objectives:
        - To explore HCPs' understanding of reproductive health data management.
        - To determine HCPs' perceived confidence in performing reproductive HIM tasks.

    - To examine HCPs' views regarding the organisational factors influencing reproductive health data management tasks.
    - To establish HCPs' views regarding the usability of the data collection tool.
- To assess the quality of reproductive health data at the facility.

*Phase 2*

- To explore managers' role in the management of reproductive health information.
- To assess reproductive health information's use in decision-making at the facility.
- To identify barriers and opportunities for effective data management processes.

*Phase 3*

- To develop strategies for improving reproductive health data management.

## 3.3 RESEARCH DESIGN

A research design is an overall plan for gathering data and obtaining answers to research questions considering the number of subject groups, the timing of data collection and study interventions, if any (Gray & Grove 2021:809). A research design involves the intersection of inquiry strategies and specific methods used to guide researchers in implementing their research (Gray, Grove & Sutherland 2017:52). The focus is on expected end results and all the steps involved in the research processes. It is an outline of how the researcher will conduct the project and how observations will be carried out (Fouché, Delport & de Vos 2017:143).

This study was undertaken over three phases. The first two phases involved a sequential explanatory, mixed-method design. According to Polit and Beck (2021:594), explanatory designs are sequential designs where quantitative data are collected and analysed first, followed by the collection and analysis of qualitative data. Data from the qualitative phase were used to build on and explain data from the quantitative phase (Grove & Gray 2019:435). Both findings were integrated during the interpretation phase. Creswell (2015:38) argues that the sequential explanatory design's strength is that it allows two phases of the study to build on each other over two different, easily recognised stages. The quantitative phase of the explanatory

sequential design is used to establish evidence related to incidence and relationships, while the qualitative phase provides a robust explanatory description of the human experience aspects of the quantitative results (Gray et al 2017:311).

In this study, quantitative methods were employed in phase one to determine the use of RHIS in generating reliable and quality data, and to assess the quality of reproductive health data. In phase two, qualitative methods were employed to explore facility managers' role in managing reproductive health information, assess the use of reproductive health information in decision-making, and identify barriers and opportunities for effective data management processes. Both quantitative and qualitative designs were given equal priority and their findings were integrated. The interpretations of the integrated findings from phases one and two of the study guided the planning and implementation of phase three.

The researcher believed that there are experts with vast knowledge in data management and the reproductive health programme. These experts could offer sound and objective judgement on the validity of the proposed strategies for improving reproductive health data management. A modified Delphi technique was therefore used in phase three of the study to assist the researcher in gaining consensus from experts regarding strategies that would be useful in improving reproductive health data management. A Delphi process is a consensus method aimed at determining the level of agreement about an issue of concern (Stanyon, Goldberg, Astle, Griffiths & Gordon 2017:583).

### 3.3.1 Mixed method

Ivankova et al (2017:313) describe mixed-method research as a type of research where qualitative and quantitative research techniques, methods and approaches are combined in a single study. It entails more than simply collecting quantitative and qualitative data; instead, data are integrated, related or mixed at some stage of the research process (Creswell & Creswell 2018:348; Delport & Fouché 2017:435). Polit and Beck (2021:586) affirm that data integration gives rise to meta-inferences, which is the conclusion developed by integrating inferences from quantitative and qualitative results.

Mixed-method research can be used to address different research objectives and is found to be very helpful in gaining an in-depth understanding of trends, personal perspectives, and explaining relationships among variables. Mixed methods are also used in evaluating the development and outcomes of a programme. It involves the collection of both numeric and text information (concurrently or in sequence) to address different aspects of the research problem, providing a complete understanding (Delport & Fouché 2017:435; Ivankova et al 2017:315).

In mixed-method research, knowledge about real-world issues is constructed based on the philosophy of pragmatism. The researcher adopted a pragmatic view, which believes in enhancing evidence through the judicious triangulation of qualitative and quantitative methods. Pragmatists focus on the research problem and use all available approaches to best understand the problem rather than the method used (Ivankova et al 2017:312; Polit & Beck 2021:587). In this study, both quantitative and qualitative methods were utilised to better understand the current use of RHIS in generating quality reproductive health data; and the use of reproductive health information in decision-making in Tshwane district, Region 3. Ultimately, strategies were developed to improve the management of reproductive health data.

The RHIS is complex in nature and could be best addressed with mixed-method research. Using both quantitative and qualitative methods together allows each one to work best, preventing the limitations of a single approach and contributing more to the understanding of the research problem (Grove & Grey 2019:431). Biases inherent in a single approach are also reduced when both methods are implemented together. Data sources are triangulated, and data are merged or used to reinforce each other (Polit & Beck 2017:578).

### 3.3.2 Quantitative phase

Gray and Grove (2021:820) describe quantitative research as a systematic, objective and formal process in which numerical data are used to answer a research question. Quantitative evidence is collected according to a pre-established plan, using structured methods to collect the required information. It is conducted to describe variables, examine relationships among variables, and determine an intervention's

effect (Polit & Beck 2017:11; Polit & Beck 2021:10). One quantitative characteristic described by Polit and Beck (2021:741) is the use of formal measurements and the involvement of rigorous control to minimise bias and maximise validity.

Quantitative designs are also based on positivists' methodological assumption about the researcher's involvement while gathering evidence. With quantitative designs, the researcher collects data as an outsider, using a pre-established data collection plan and tools. Large samples are selected to improve representativeness and seek generalisation of the results. Data are then analysed using statistical analysis (Polit & Beck 2017:10).

A quantitative approach was selected to determine how RHIS is used to produce reliable and quality data and assess the quality of reproductive health data. Data quality refers to complete, accurate, reliable and accessible data, and can best be assessed through numerical data and analysed using statistics. The researcher did not participate in the event under investigation but became an external data collector from a large sample, using structured data collection tools, a questionnaire, and a checklist to allow quantitative measurements. Statistical tests were ultimately performed to analyse the data.

### 3.3.3 Qualitative phase

Qualitative research involves an in-depth investigation of a phenomenon in a holistic manner by collecting rich narrative data (Polit & Beck 2021:800). Gray and Grove (2021:820) further describe the qualitative design as a rigorous approach used to describe life experiences, cultures, and social processes from the perspective of the person involved. Qualitative designs are based on constructivist traditions, which emphasise human beings' natural complexity and their ability to shape and create their own experiences. Constructivists emphasise the dynamic, holistic and individual aspects of human life and attempt to capture those aspects in their entirety, within the context of those experiencing them (Polit & Beck 2017:12).

The purpose of qualitative research is to elicit participants' interpretation of meaning and experiences from their own written or spoken words. Participants' beliefs and

values about the phenomenon are identified, described and understood rather than predicting human behaviour (Fouché & Delport 2017:65). Nieuwenhuis (2017:53) affirms that qualitative research relies on linguistic data to obtain meaning rather than numerical data which requires statistical forms of analysis. The researcher explores reality from the insider's perspective as opposed to the outsider's perspective, and selects a small sample to answer the research question (Fouché & Delport 2017:65).

The qualitative phase was justified by the need to understand and explain the results obtained in the quantitative phase and interpret the relationship among the findings (Creswell & Plano Clark 2018:263). This phase was also conducted to describe and explain facility managers' role in data management and use of reproductive health information, taking the barriers and possible opportunities encountered in the work environment into consideration. The researcher sought to answer questions about the phenomenon, and understand the phenomenon from facility managers' point of view within their working environment through in-depth interviews (Fouché & Delport 2017:64). Participants provided information which was used to generate themes.

### 3.3.4 Delphi technique

A Delphi technique is a method to obtain judgements from experts about an issue of concern or interest (Polit & Beck 2017:725). It is further described as a consensus method that endeavours to achieve a certain level of agreement on an important issue (Stanyon et al 2017:583; Stewart, Gibson-Smith, MacLure, Mair, Alonso, Codina et al 2017:3). It involves experts completing various rounds of a questionnaire to achieve consensus (Polit & Beck 2021:236).

The researcher applied a modified Delphi technique in seeking consensus regarding the proposed strategies for improving reproductive health data management, instead of a classic Delphi technique. With the classic Delphi, the first round of data collection is open-ended, generating qualitative data that are used to develop statements for the questionnaires (Stewart et al 2017:3; Zelmer, van Hoof, Notarianni, van Mierlo, Schellenberg & Tannenbaum 2018:3). In contrast, a modified Delphi can either replace the first round of questionnaires with face-to-face interviews or focus groups, or

generate survey statements from either literature or previous research findings (Stewart et al 2017:3; 6).

The rationale for using this technique is the belief that experts' combined opinions in data management, reproductive health programmes, and capacity building are more valid than the researcher's individual opinion. The modified Delphi technique was considered appropriate for the study since the researcher had already collected data in phases one and two of the study. The study's findings, together with literature relevant to data management and reproductive health programmes, were utilised to develop draft strategies. Experts' opinions were then sought over two Delphi rounds.

## 3.4 STUDY SETTING

Polit and Beck (2021:803) describe the setting as a physical area where data will be collected. The study was conducted in 11 primary health care clinics, one community health care centre, one districts hospital, and the Tshwane District Health Office. All these facilities are based in Tshwane, Region 3, which is situated in the central and western part of Tshwane and is sub-divided into 23 municipal wards (Gauteng Province & City of Tshwane 2016:12).

The 11 primary health care clinics are fixed clinics offering comprehensive and integrated primary health care services, including reproductive health services. The services are offered for at least eight hours a day, at least five days a week. The community health care centre is also a fixed structure offering the same services as the primary health care, along with oral health and rehabilitation for seven days a week. It further provides accident, emergency and midwifery services 24 hours a day. The district hospital provides the district package of care, including paediatrics, obstetrics and gynaecology, internal medicine, general surgery, and family medicine on a 24-hour basis; and receives outreach and support from general specialists. All these facilities fall under the administration of a district health management team, stationed at the Gauteng Department of Health Tshwane District offices (DoH 2016:20). Figure 3.1 presents a map of the City of Tshwane's municipal boundaries according to regions.

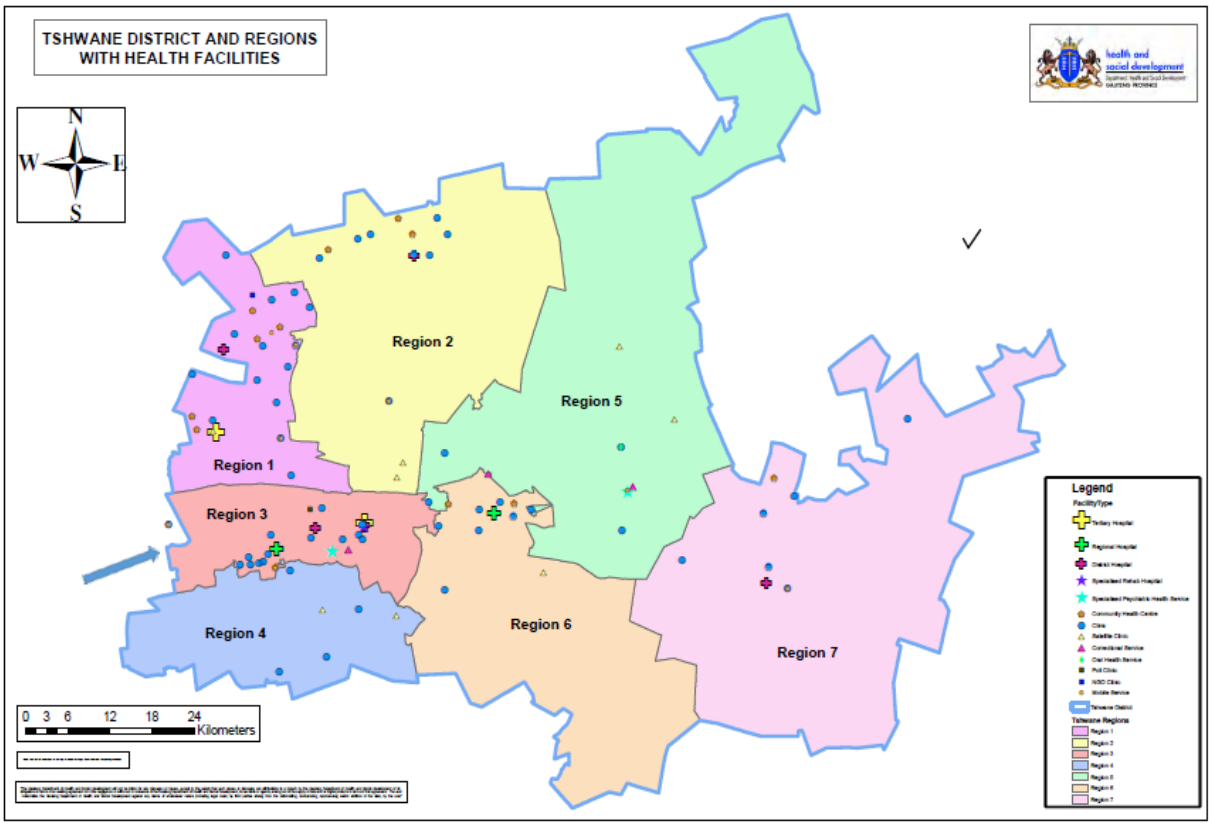


**Figure 3.1: Map of Tshwane**

**(Source: Gauteng Province and City of Tshwane 2016:12)**

## 3.5 RESEARCH METHODS FOR PHASE ONE (QUANTITATIVE)

Research methods are the specific ways in which the researcher chooses to undertake a study, within the chosen design (Gray & Grove 2021:235). They are techniques and research procedures that are followed when conducting the research. These methods centre around the setting, population, sample and sampling, data collection and analysis, the validity and reliability or trustworthiness of research, and ethical considerations (Polit & Beck 2021:8).

### 3.5.1 Population

A population is the entire group of people or type of elements with common characteristics in which the researcher is interested (Polit & Beck 2021:797). The elements are limited to human beings but may include plants, animals, records, blood samples, and events, among others (Gray & Grove 2021:60). Strydom (2017:223)

considers the population as the totality of persons, events, organisation units, case records or other units with which the research problem is concerned.

In this phase of the study, the target population was the HCPs working at Tshwane district, Region 3 health care facilities, RHIS monthly reports, and health information management directives. The study targeted HCPs because they offer reproductive health services daily and are responsible for routine data collection. The population size for HCPs was estimated at 159. The RHIS monthly reports serve as evidence of data quality, and each facility generates one report per month. Each facility is thus expected to have six reports covering a period of six months. Management directives reflect possible measures implemented at the facility to enforce the quality of the data obtained from health information managers.

### 3.5.2 Sampling

Sampling is the process of selecting cases, which may include a group of people, events, behaviours, or other elements to represent the entire population (Gray & Grove 2021:410; Polit & Beck 2021:261). A probability sampling approach was adopted for the study, where every member or element of the population has an equal opportunity to be selected for the sample (Gray et al 2017:336; Gray & Grove 2021:419). The stratified sampling technique was used to select the sample. HCPs were stratified according to their professional qualifications as doctors, professional nurses and enrolled nurses. Participants were proportionally selected from each stratum, remaining cognisant of the size of each stratum (doctors, professional and enrolled nurses) to ensure true representativeness. The researcher utilised the technique to ensure that doctors, professional and enrolled nurses acquired sufficient representation in the sample (Polit & Beck 2021:268; Strydom 2017:230).

All facility generated monthly reports over a period of six months; HIM directives from all 13 facilities; and monthly DHIS software-generated reports over a period of six months from the district office were selected and examined. No sampling was conducted.

#### 3.5.2.1 Eligibility criteria

Eligibility criteria include all the characteristics that a subject or element must possess to be included in the target population (Gray & Grove 2021:412).

In this study, the inclusion criteria were:

- Professional and enrolled nurses and doctors providing reproductive health services at the Tshwane district health facilities.
- HCPs older than 18 years.
- Monthly reports generated from the facility
- DHIS software reports.
- Data management directives from health information managers.

#### 3.5.2.2 Exclusion criteria

Gray and Grove (2021:413) describe exclusion criteria as all the “characteristics that can cause the person or an element to be excluded from the target population”.

In this study, the exclusion criteria were:

- Enrolled nursing assistants and other health care professionals not mentioned in the inclusion criteria.
- Any other reproductive health reports not generated through RHIS data.

### 3.5.3 Sampling procedure

In this study, the following procedures were used to select the sample of respondents and records:

The researcher sought the assistance of the human resource officer at the Tshwane district office. The human resource officer issued the researcher with a list of HCPs, according to categories and their number per facility. The number of doctors,

professional and enrolled nurses per facility was determined and the sample size per facility was drawn according to the proportions.

On the data collection day, the researcher requested the daily attendance register for all HCPs and utilised it develop the sample frame – a name list of the HCPs (Polit & Beck 2021:266). Within each stratum of doctors, professional and enrolled nurses, simple random sampling was conducted to select the required sample size per strata. A random table was designed for each stratum, and the required number was selected by establishing a starting point and randomly placing the finger anywhere on the table. The process continued until the required number of respondents were selected per strata.

The researcher approached and explained the purpose of the study to the selected participants. Those who gave verbal consent were issued a consent form (see Annexure B) and questionnaire to complete (see Annexure C).

For the facility monthly reports and HIM directives, the researcher approached the facility manager and requested permission to review the records. The facility manager retrieved all available monthly reports and directives. The district health information officer was also approached, and the researcher requested permission to review the monthly DHIS software-generated reports. All requested reports were retrieved by the district health information officer for review.

### 3.5.4 Sample size

The sample size refers to the number of participants or respondents who are recruited and actually participate in the study (Gray & Grove 2021:823). The sample was selected using stratified random sampling from 13 health care facilities. The population size for HCPs was 156, based on the Raosoft online sample calculator, with 5% margin of error, 95% confidence level, and 50% response distribution; a sample size of 111 was thus deemed representative.

According to the sampling frame obtained from the human resource office, there were 130 professional nurses, nine doctors and 18 enrolled nurses. The total sample size

required was 111. The following formula was used to calculate the required sample size per strata.

$n_1 = (h_1/N)n$ — $n_1$ = sample size per strata

$n_1 = (130/156)111$ — $h_1$ =stratum size1

$n_1 = 92$ professional nurses — N= population size

n= total sample size

$n_2 = (9/156)111$

$n_2 = 6$ doctors

$n_3 = (18/156)111$

$n_3 = 13$ enrolled nurses

Therefore, 92 professional nurses, 13 enrolled nurses and six doctors participated in the study.

Six monthly reports were assessed from each facility, totalling 78 (6 for each facility) reports from 13 facilities, which were assessed from the district office. All available records of data management directives from the district office were also reviewed. The sample of participants, monthly reports and directives was large enough to represent the target population.

### 3.5.5 Data collection approach and method

Gray and Grove (2021:808) define data collection as the precise, organised gathering of information appropriate to the study's purpose, specific objectives or research questions. A structured data collection approach was adopted in this phase by utilising a self-administered questionnaire and checklist.

Data were collected from four sources, namely HCPs, facility-generated monthly reports, HIM directives, and monthly DHIS software-generated reports from the district office. Data collection from HCPs, facility-generated monthly reports, and HIM directives took place concurrently at the facilities, followed by the collection of data from monthly DHIS software-generated reports at the district office.

A questionnaire was used to collect data from HCPs to determine the use of RHIS in producing reliable and quality data. A checklist was also employed to assess the quality of data from facility-generated monthly reports, HIM directives, and monthly DHIS software-generated reports.

#### 3.5.5.1 Data collection instruments

Data were collected using a structured questionnaire and checklist, both adapted from the PRISM tools (see Annexure C and D), after permission was obtained from MEASURE Evaluation SIFSA (see Annexure E). PRISM tools were found to be relevant and reliable in assessing data quality and the use of information, and can be used to assess the relationships between technical, behavioural and organisational determinants of health information system processes and performance (Mucee et al 2016:664).

##### 3.5.5.1.1 Questionnaire

A questionnaire is a document containing questions and statements intended to solicit information for analysis through written responses (Delport & Roestenburg 2017:186). The questionnaire enabled the researcher to obtain factual information about participants' understanding, experiences, views and perceptions of how RHIS is used to produce reliable and quality reproductive health data.

Questionnaires were cost-effective because the researcher managed to collect data from a large sample within a limited time. They also protected participants' anonymity because no identifying information was required on the questionnaire, which resulted in a high response rate. The format and the content were the same for all participants, therefore the responses to the questionnaires were not dependent upon the mood of the researcher, as may be the case with interviews (Polit & Beck 2017:275).

**a) Development and testing the questionnaire**

The questionnaire was developed based on the purpose and objectives of the study and by using the literature review to adapt the PRISM tools. The supervisor's

assistance was sought in the design of the questionnaire. The items in the questionnaire measured aspects involved in generating relevant, reliable and accurate reproductive health data using RHIS. The questionnaire was in English, since it is the medium of communication in the city and all HCPs had at least a post-matric qualification.

The questionnaire contained closed-ended questions, and presented a set of responses from which the respondents could choose. Closed-ended questions generate data that are easy to analyse (Maree & Pietersen 2017:180; Delport & Roestenburg 2017:200). The questionnaire used different types of questions, namely: dichotomous, multiple-choice and scale questions. Dichotomous questions had only two possible answers, while multiple-choice had three or more responses from which to choose. Scale questions had three or more options where respondents were expected to mark a certain point on the scale in terms of their views and perceptions.

The questionnaire was pre-tested with ten participants from two different facilities. These participants did not take part in the main study. The pre-testing was conducted in February 2018. Pre-testing ensures that errors can be corrected immediately, it aids in improving face and content validity, and determines the estimated time required to complete the questionnaire (Delport & Roestenburg 2017:195; Polit & Back 2017:269).

Participants were requested to ask for clarity on any questions not well understood and comment on the structure and types of questions. The time taken to complete the questionnaire was taken into account, which was 25 to 35 minutes. Their comments and input were utilised to revise the questionnaire as follows:

- Section A assessed respondents' socio-demographic information and was not changed because it was clear to the respondents.
- Section B intended to assess the HCPs' understanding of reproductive health data management. The respondents were asked to select the age group to record reproductive health services on the RHIS tool. The response options included "12 years and above", "15 years and above", "between 15 and 49 years", and "all age groups". The respondents found the question and the responses confusing. The

question was then changed to the statement, “Reproductive health services are recorded on RHIS when offered to clients at the following ages”. The response options were then changed to “below 15 years”, “between 15 to 49 years” and “all age groups”.

No changes were made to the following sections because they were clear:

- Section C intended to evaluate HCPs’ perceived confidence in performing reproductive health information management tasks.
- Section D intended to examine HCPs’ views regarding contextual factors that influence data management tasks.
- Section E intended to establish HCPs’ views regarding the usability of the data collection tool.

**b) Composition of the revised questionnaire**

The questionnaire consisted of five sections (see Annexure C):

- *Section A: Socio-demographic information*. The socio-demographic information included the participants’ gender, age, level of education, position in the facility, years of service in the current position, RHIS and reproductive health training attended. The information was useful in determining whether the data had any influence on how RHIS is used to produce reliable and quality reproductive health data.
- *Section B: HCPs’ understanding of reproductive health data management.* This section assessed HCPs’ understanding of the recording of reproductive health data elements and facility reporting requirements.
- *Section C: HCPs’ perceived confidence in performing reproductive HIM tasks*. This section assessed HCPs’ perceived level of confidence in collecting, processing, presenting data, and using reproductive health information for decision-making.
- *Section D: HCPs’ views regarding organisational factors that influence data management tasks*. This section assessed HCPs’ views regarding the practices of

the use of reproductive health information, the availability of resources, and the level of support and supervision provided by the HIM directorate.

- *Section E: HCPs' views regarding the usability of the data collection tool*. This section examined HCPs' views regarding the efficiency and efficacy of the data collection tool (Minimum data set tool).

#### 3.5.5.1.2 Checklist

A checklist is a structured data collection tool used to record observations of a specific phenomenon (Polit & Beck 2021:296). It contains a check box that is used by the observer to indicate whether the attribute being measured is present or not. Checklists are also used to evaluate the implementation of a specific programme or policy (Delport & Roestenburg 2017:202). In this study, a criteria checklist was used to determine monthly reports' data quality and management directives. Criteria checklists are used for evaluation purposes and list characteristics that are either absent or present in the situation being observed (Delport & Roestenburg 2017:203). Six-months' facility monthly reports and the DHIS software reports were reviewed for availability, accuracy, completeness and timeliness; and the availability of directives was assessed using the checklist (see Annexure D).

**a) Development and testing of the checklist**

The researcher developed a checklist through a review of literature and by adapting PRISM tools. Items in the checklist assessed data quality, using criteria or dimensions of data quality such as data availability, accuracy, completeness, and timeliness. The supervisor's assistance was sought in the design of the checklist.

The checklist was pre-tested at two facilities that were not part of the main study. Twelve facility-generated monthly reports and DHIS software-generated reports for the two facilities were assessed. All available and omitted data were identified from the records. The checklist was then revised for better and more efficient data collection based on the shortcomings and challenges encountered with the tool. The pretesting was conducted in February 2018.

### b) Composition of the checklist

The checklist/data collection form consisted of five parts (see Annexure D):

- *Part 1: Assessor and facility information*. Information included the facility type, assessor's name and date of assessment.
- *Part 2: Availability*. This part assessed the availability of the facility-generated monthly reports.
- *Part 3: Accuracy*. The accuracy was assessed by comparing the data presented on facility-generated reports with data presented on DHIS software-generated reports.
- *Part 4: Completeness*. This part of the checklist assessed the completeness of facility-generated monthly reports by checking if all data elements that are supposed to be reported on, are reported on.
- *Part 5: Timeliness*: This part assessed whether the facility submits reports to the district at the required time, as indicated in the procedural manual.

### 3.5.6 Data collection and management process

Permission to conduct the study and handle facility reports was sought from the Health Studies Research and Ethics Committee of UNISA (see Annexure H), the Tshwane Research Committee (see Annexure A), and facility managers prior to data collection.

In the first phase, data were collected from the facilities and district office using a questionnaire and checklist. On the day of data collection, the researcher reported at the facilities at 07:20 while respondents were having morning meetings, as arranged with the facility manager. The selected respondents were approached and asked to take part in the study. They were informed about the purpose of the study and issued with the consent form. Those who consented to take part were issued a questionnaire to complete and were allowed to ask for clarity, where necessary. Respondents were informed that the questionnaire would be collected on the same day after the researcher reviewed the reports. The researcher collected questionnaires before leaving the facility. A total of 140 questionnaires were distributed to doctors,

professional nurses, and enrolled nurses. One hundred and eleven questionnaires were completed, thus yielding a 79% response rate.

On the same day, the researcher sought assistance from the facility manager to retrieve the six-monthly reports required for review and management directives. The reports were reviewed instantly using the checklist and submitted back to the facility manager for safe-keeping. Thirteen health care facilities were assessed for data quality using a checklist. The researcher collected data from one facility per day, spending five to seven hours at each facility.

After reviewing the records in all facilities and collecting all questionnaires, the researcher arranged an appointment with the district health information officer to review DHIS software-generated reports. The researcher visited the district office on the arranged date and sought assistance from the health information officer to retrieve all DHIS software-generated reports for all 13 facilities. The same checklist was used to review the records and reports were submitted back to the officer after the review. The researcher kept the completed checklist and questionnaires secure, and no participant or facility names were written on the data collection tools.

### 3.5.7 Data analysis

Quantitative data analysis is the technique by which the researcher translates data to numerical form and subjects it to statistical analysis. The purpose is to reduce, organise, and give meaning to data (Fouché & Bartley 2017:249). The researcher translated data from the questionnaires and checklists into excel format with the supervisor and a statistician's assistance. Data were verified and analysed by the statistician using the SPSS statistical software package; the analysis included descriptive and inferential statistics (Polit & Beck 2017:356).

Descriptive statistics were used to describe and summarise the data (Lobiondo-Wood & Haber 2018:282). It allowed the researcher to summarise and describe the use of the RHIS in producing reliable and quality reproductive health data. Cross-tabulations were used to examine the relationships among variables, and the level of reproductive data quality was analysed using descriptive statistics. Data were organised according

to frequency distribution, measures of central tendency, and dispersion to give meaning to the findings (Polgar & Thomas 2020:102; Polit & Beck 2017:358).

In addition to descriptive statistics, an exploratory factor analysis (EFA) was performed to measure the underlying structure, patterns and hidden dimensions within the dataset. EFA is a multivariate statistical procedure used to reduce a large number of variables or factors into a smaller set that can be used to represent relationships among sets of interrelated variables (Gray & Grove 2021:671). EFA is used when the researcher has no expectations of the number or nature of the factors. The aim is to explore the main variables to generate a model or theory from a large set of hidden constructs (Taherdoost, Sahibuddin & Jalaliyoon [Sa]:376; Williams, Onsman & Brown 2010:2). The results of the EFA assisted the researcher in identifying and understanding questions that measure the same concept, questions that represent a subset of variables, items that stand alone, and unique concepts (Gray & Grove 2021:671). Furthermore, the EFA enabled the researcher to explore interrelationships among the variables, employed to determine the use of the RHIS in producing reliable and quality reproductive health data.

### 3.5.8 Validity and reliability

Brink et al (2018:82) emphasise the importance of the validity and reliability of the findings in ensuring the quality of the study. Validity refers to the degree to which conclusions made in a study are not biased but well-founded (Polit & Beck 2021:806). Reliability refers to the accuracy and consistency of the study's information (Polit & Beck 2021:801). Is reflects the researcher's ability to produce the same results when using the same methods (Brink et al 2018:82). Therefore, a valid instrument is also accurate and reliable. The validity and reliability of the data collection tools employed in this study were assessed to ensure the results are of good quality.

#### 3.5.8.1 Validity of data collection instrument

The validity of an instrument implies that the instrument measures what it is supposed to measure. Face validity requires that the measuring instrument should appear to be measuring the appropriate construct, while content validity is concerned with the

extent to which the data collection instrument contains appropriate items for the construct being measured and adequately covers the construct domain (Gray & Grove 2021:459; Pietersen & Maree 2017:239; Polit & Beck 2017:310).

The face and content validity of the tools were previously established in Ghana through a review and consultation with experts, while construct validity was supported by the association found between the technical, organisational and behavioural factors and use of information (Hotchkiss, Anwer, Lippeveld & Mukooyo 2010:6). Although the PRISM tools were previously found to be valid, the researcher further implemented measures to ensure validity because some items were added to the instrument.

Items added on the instruments were directed by literature review and the research objectives. The supervisor and health information experts' assistance were sought to review the instruments' face and content validity. The questionnaire and the checklist were pre-tested in two health care facilities, and participants' opinions and suggestions were taken into account when reviewing the tools. The researcher ensured validity by maintaining a high level of accuracy and precision in the measurements by conducting an instrument statistical validity test.

#### 3.5.8.1.1 Statistical validity

The statistical validity of the items in the research instrument was explored using the EFA data reduction technique. The EFA was used to investigate and confirm the construct validity of the instrument. Data were analysed to determine the relationship among various items of the instrument, and related items were clustered into a factor (Gray & Grove 2021:470). Each factor was named according to the meaning generated from the analysis.

Prior to performing the EFA, the sampling adequacy of survey items was measured based on the Keiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) criterion. The KMO-MSA is used to evaluate the strength of the correlation between items in the EFA correlation matrix, and measure the suitability of the data for factor analysis (Beavers, Lounsbury, Richards, Huck, Skolits & Esquivel 2013:4; Taherdoost

et al [Sa]:377). The disaggregated statistical validity results on the constructs and corresponding items are presented in Table 3.1.

**Table 3.1: Statistical validity of disaggregated dimensions and overall KMO-MSA criterion**

| Dimension | Items | No. of Items | KMO-MSA |
|---|---|---|---|
| Healthcare providers' understanding of reproductive health data management processes | AB08.Oral_pill_cycle<br>B09.Medroxyprogesterone_injection<br>B10.Norethisterone_enanthate_injection<br>B11.Subdermal_implant_inserted<br>B12.IUCD_inserted<br>B13.Sterilisation_performed<br>B14.Male_condom_issued<br>B15.Female_condom_issued<br>B16.Facility_send_data<br>B17.Date_data_sent | 10 | 0.795 |
| Healthcare providers' perceived confidence in performing reproductive HIM tasks | C18.Collect_data_accurately<br>C19.Check_data_accuracy<br>C20.Calculate_CYPR_correctly<br>C21.Plot_data<br>C22.Compute_trend<br>C23.Explain_findings<br>C24.Use_data_gaps<br>C25.Use_data_decisions | 8 | 0.752 |
| HCPs' views regarding organisational factors influencing data management tasks | D26.Performance_feedback_monthly<br>D27.Performance_feedback_quarterly<br>D28.Feedback_supported_evidence<br>D29.Staff_make_decisions<br>D30.Data_gathered_root_cause<br>D31.Staff_involved_select_interventions<br>D32.Staff_involved_evaluating<br>A33.DHMIS_SOPs<br>A34.DHMIS_Policy<br>A35.District_Health_Plan<br>A36.District_Health_Barometer<br>A37.Facility_Operational_Plan<br>A38.National_Indicator_Data_Set<br>A39.Health_care_providers<br>A40.Data_capturers_adequate<br>A41.Computers_sufficient<br>A42.MDS_tool<br>B43.Health_Information_Management<br>B44.HIM_Officer_checks_data | 23 | 0.808 |

| Dimension | Items | No. of Items | KMO-MSA |
|---|---|---|---|
| | B45.HIM_Officer_discusses_performance<br>B46.HIM_Officer_gives_opportunity<br>B47.HIM_Officer_conducts_training<br>B48.HIM_Officer_sends_reports | | |
| HCPs' views regarding the usability of the data collection tool | E49.MDS_tool_easy_use<br>E50.MDS_tool_complex<br>E51.MDS_tool_take_long<br>E52.MDS_tool_integrated<br>E53.MDS_tool_enough_fields<br>E54.Easy_to_enter_data<br>E55.Easy_aggregate_data_incorrectly<br>E56.MDS_data_true_reflection | 8 | 0.544 |
| **Overall scale reliability** | | **49** | **0.719** |

Since the statistically acceptable minimum KMO-MSA value was 0.600, the computed overall KMO-MSA value (=0.719) for the 49 items confirms the adequacy of the sample of items that was explored under all defined constructs. Similarly, the KMO-MSA values for the disaggregated three out of four dimensions exceeded the minimum acceptable 0.600 statistical validity score, indicating the presence of sampling adequacy. Computed statistical validity measures on determinants, Bartlett's test of sphericity, and KMO-MSA values of the survey instrument's distinct dimensions are presented in Table 3.2.

**Table 3.2: Statistical validity of the survey instrument's items per dimension**

| Dimension | No. of items | Measure | | |
|---|---|---|---|---|
| | | Determinant | Bartlett's Test of Sphericity | Keiser-Meyer-Olkin Test of Sampling Adequacy (KMO-MSA) |
| Healthcare providers' understanding of reproductive health data management processes | 10 | 0.001 | $\chi^2 = 774.420$<br>$p < 0.01$ | 0.795 |
| Healthcare providers' perceived confidence in performing reproductive HIM tasks | 8 | 0.017 | $\chi^2 = 433.965$<br>$p < 0.01$ | 0.752 |
| HCPs' views regarding organisational factors influencing data management tasks | 23 | 0.014 | $\chi^2 = 1824.116$<br>$p < 0.01$ | 0.808 |

| Dimension | No. of items | Measure | | |
|---|---|---|---|---|
| | | Determinant | Bartlett's Test of Sphericity | Keiser-Meyer-Olkin Test of Sampling Adequacy (KMO-MSA) |
| HCPs' views regarding the usability of the data collection tool | 8 | 0.113 | $\chi^2 = 216.653$ $p < 0.01$ | 0.544 |

The determinants of the correlation matrices for all dimensions are all approximately equal to zero, indicating that the matrices were indeed singular in nature, hence the matrices could not be explained by linear combinations. The Barlett's Test of Sphericity and KMO-MSA were computed to provide more complex measures to evaluate the strength of the relationships and suggest the factorability of the items. The null hypothesis of Barlett's test at 1% significance level states that the observed correlation matrix is equal to the identity matrix, suggesting that the observed matrix is not factorable (Ganyaupfu 2018; Beavers et al 2013:4).

The computed results on Barlett's test were statistically significant, with p-values for four constructs being lower than the 1% significance level. Thus, the null hypothesis was rejected, indicating that the observed correlation matrices were statistically different from singular matrices, confirming the existence of linear combinations. The Barlett's test results confirmed the validity and suitability of the responses collected by the data collection instrument. The computed KMO-MSA values above 0.600 for all four dimensions therefore indicated the presence of sampling adequacy.

#### 3.5.8.2 Reliability of data collection instrument

Reliability means the consistency, stability and repeatability of information as well as the researcher's ability to collect accurate information over a specified period (Polit & Beck 2021:316). Consistency is about the stability of the instrument over time. It assesses the degree to which the instrument will give the same result if used under the same circumstances but at a different time (Pietersen & Maree 2017:239; Polit & Beck 2017:731).

The reliability of the PRISM tools was assessed in previous studies, and an alpha score of 0.7 and higher was obtained when assessing internal consistency, reflecting higher reliability (Hotchkiss et al 2010:6). Although the PRISM tools were previously found to be reliable, to achieve statistical reliability and scientific merit, items added on the instruments were directed by literature review and the research objectives, and a Cronbach's alpha coefficient test was conducted to establish internal consistency.

#### 3.5.8.2.1 Internal consistency

Internal consistency addresses the extent to which all items on an instrument measure a certain construct (Gray & Grove 2021:461; Polit & Beck 2021:789). The internal consistency of the research instrument's items was examined based on Cronbach's alpha criterion. Gray and Grove (2021:780) describe Cronbach's alpha as the statistical procedure used to indicate the degree to which different items on a questionnaire measure the same construct. It is further described as a coefficient that measures the correlation between the answers in a questionnaire by analysing the profile of answers given by respondents. It is used when questions are rated on internal scales, such as five-point Likert scales (Gottems, Carvalho, Guilhem & Pires 2018:3; Lobiondo-Wood & Haber 2018:273; Okoro, Musonda & Agumba 2018:3).

Technically, the scale reliability test was undertaken to statistically determine the degree to which the chosen set of survey items measured a single, one-dimensional, latent construct. In other words, Cronbach's alpha coefficient was computed to statistically assess the extent to which similar responses could be obtained from participants should the same set of questions be posed to the same respondents several times under similar settings. The disaggregated and overall scale reliability results of the four dimensions of the research instrument were presented. The four dimensions included 'understanding of reproductive health data management processes', 'confidence in performing reproductive HIM tasks', 'factors that influence data management tasks', and the 'usability of the data collection tool'.

## Table 3.3: Scale reliability of the research instrument's items

| Dimension | Items | No. of Items | Cronbach's alpha |
|---|---|---|---|
| Healthcare providers' understanding of reproductive health data management processes | AB08.Oral_pill_cycle<br>B09.Medroxyprogesterone_injection<br>B10.Norethisterone_enanthate_injection<br>B11.Subdermal_implant_inserted<br>B12.IUD_inserted<br>B13.Sterilisation_performed<br>B14.Male_condom_issued<br>B15.Female_condom_issued<br>B16.Facility_send_data<br>B17.Date_data_sent | 10 | 0.826 |
| Healthcare providers' perceived confidence in performing reproductive HIM tasks | C18.Collect_data_accurately<br>C19.Check_data_accuracy<br>C20.Calculate_CYPR_correctly<br>C21.Plot_data<br>C22.Compute_trend<br>C23.Explain_findings<br>C24.Use_data_gaps<br>C25.Use_data_decisions | 8 | 0.911 |
| HCPs' views regarding organisational factors influencing data management tasks | D26.Performance_feedback_monthly<br>D27.Performance_feedback_quarterly<br>D28.Feedback_supported_evidence<br>D29.Staff_make_decisions<br>D30.Data_gathered_root_cause<br>D31.Staff_involved_select_interventions<br>D32.Staff_involved_evaluating<br>A33.DHMIS_SOPs<br>A34.DHMIS_Policy<br>A35.District_Health_Plan<br>A36.District_Health_Barometer<br>A37.Facility_Operational_Plan<br>A38.National_Indicator_Data_Set<br>A39.Health_care_providers<br>A40.Data_capturers_adequate<br>A41.Computers_sufficient<br>A42.MDS_tool<br>B43.Health_Information_Management<br>B44.HIM_Officer_checks_data<br>B45.HIM_Officer_discusses_performance<br>B46.HIM_Officer_gives_opportunity<br>B47.HIM_Officer_conducts_training<br>B48.HIM_Officer_sends_reports | 23 | 0.915 |

| Dimension | Items | No. of Items | Cronbach's alpha |
|---|---|---|---|
| HCPs' views regarding the usability of the data collection tool | E49.MDS_tool_easy_use<br>E50.MDS_tool_complex<br>E51.MDS_tool_take_long<br>E52.MDS_tool_integrated<br>E53.MDS_tool_enough_fields<br>E54.Easy_to_enter_data<br>E55.Easy_aggregate_data_incorrectly<br>E56.MDS_data_true_reflection | 8 | 0.336 |
| **Overall scale reliability** | | **49** | **0.875** |

A Cronbach's alpha coefficient value equal to 0.875 for the instrument's 49 items was achieved. This was above the minimum threshold of 0.7 as an acceptable reliability score (Gray & Grove 2021:462). LoBiondo-Wood and Haber (2018:273) affirm that a Cronbach's alpha coefficient score of above 0.70 is sufficient to confirm the instrument's reliability. This result reveals that items measured a single unidimensional latent construct.

## 3.6 RESEARCH METHODS FOR PHASE TWO (QUALITATIVE)

### 3.6.1 Population

The target population for the qualitative phase was facility managers because they were the data managers responsible for the use of information for decision-making. According to Gray and Grove (2021:411), the target population is all individuals who meet the sampling criteria.

### 3.6.2 Sampling

Sampling is a process of selecting a group of people to represent the total population (Polit & Beck 2021:802). A non-probability sampling approach was adopted for the study. Although a non-probability sampling approach does not afford every element in a population opportunity to be included in the sample, the researcher included the majority of subjects meeting the eligibility criteria who were willing to participate in the study (Gray & Grove 2021:426; Polit & Beck 2021:262). A purposive critical-case sampling technique was used to select the participants. Purposive sampling is a

technique used to select participants that are representative, knowledgeable, and can inform an understanding of the research problem and central phenomenon in the study (Brink et al 2018:127; Creswell & Poth 2018:158).

With critical-case sampling, the researcher seeks critical cases that are important in gaining an understanding of the purpose of the study (Gray et al 2017:345; Polit & Beck 2017:495). It involves “selecting a small number of important cases to yield the most information and have the greatest impact on the development of knowledge” (Guetterman 2015).

The sample was limited to officially appointed facility managers because they are responsible for data management and use the information for decision-making in the facility. The sample of 11 facility managers, as determined by data saturation, was interviewed. Saturation entails the collection of qualitative data to the point where a sense of closure is reached because data becomes repetitive, and no new information can be discovered (Polit & Beck 2021:802). In addition, the size of the sample in qualitative studies is based on the sufficiency of the obtained information to address the research question (Moule, Aveyard & Goodman 2017:167).

#### 3.6.2.1 Inclusion criterion

- All professional nurses officially appointed as facility managers were included in the study.

#### 3.6.2.2 Exclusion criterion

- All professional nurses or doctors acting as facility/operational managers for either clinics or community health care centres were excluded from the study.

### 3.6.3 Data collection approach and methods

A semi-structured, one-on-one interview was used to collect data. The interviews were organised around predetermined open-ended questions set on an interview guide

(Gray & Grove 2021:330; Greeff 2017:351). It enabled the researcher to collect detailed information about the participants' experiences with regard to the data management process and use of reproductive health information for decision-making in their facilities. Semi-structured interviews allowed the researcher and participants the flexibility to ask and respond to questions (Gray & Grove 2021:330). The researcher was therefore able to follow-up on specific interesting information raised during the interview.

#### 3.6.3.1 The interview guide

The interview guide was designed to guide the engagement with the facility managers and contained open-ended questions and suggestions for probes to elicit more information. Questions were arranged from broad to specific, ensuring the topic was covered thoroughly. All questions were neutral and non-leading (Greeff 2017:352). The questions were structured according to information obtained from literature and the quantitative phase of the study. The interview guide included questions that needed to be answered to explain the quantitative findings. This question focused on facility managers' role in managing reproductive health data and use of reproductive health information for decision-making. Their role in ensuring a culture of information use and the challenges they were faced with during the process were also discussed in phase two (See Annexure F).

##### 3.6.3.1.1 Development of the interview guide

The interview guide was developed and refined following the interview protocol refinement process, as reflected in Castillo-Montoya (2016:812).

**a) Phase one: Ensuring that areas of questioning align with research questions**

To ensure that areas of questioning align with research questions, the researcher developed an interview protocol matrix to map the required areas of questioning to research questions. The matrix was used to indicate whether a particular area of

questioning had the potential of answering a particular research question (see Table 3.4).

**Table 3.4: Interview protocol matrix**

| | **Background information** | **Research Question 1** What is the quality of reproductive health data generated by the DHIS? | **Research Question 2** How is reproductive health information used in decision-making? | **Research Question 3** What are barriers and opportunities for effective reproductive data management? |
|---|---|---|---|---|
| **Area of questioning 1** | Please describe your specific role in the HIMS. | | | |
| **Area of questioning 2** | | What are your views regarding the status of reproductive health data produced by the DHIS currently? | | |
| **Area of questioning 3** | | How are the staff members supported to produce good quality reproductive health data? | | |
| **Area of questioning 4** | | | Please explain your specific role in the use of reproductive health information to make evidence-based decisions. | |
| **Area of questioning 5** | | | How is the reproductive health information used for decision-making? | |
| **Area of questioning 6** | | | How do you ensure that reproductive health information is used for decision-making? | |
| **Area of questioning 7** | | | What measures/strategies do you use to develop an information culture in the facilities? | |
| **Area of questioning 8** | | | | Explain the barriers/challenges to the production of |

| | Background information | Research Question 1 What is the quality of reproductive health data generated by the DHIS? | Research Question 2 How is reproductive health information used in decision-making? | Research Question 3 What are barriers and opportunities for effective reproductive data management? |
|---|---|---|---|---|
| | | | | relevant, reliable and quality reproductive health data. |
| **Area of questioning 9** | | | | What are the opportunities for improvement? |

### b) Phase two: Constructing an inquiry-based conversation

According to Castillo-Montoya (2016:813), inquiry-based conversation is a balance between an inquiry and a conversation. The interview schedule was used as an instrument of inquiry and as an instrument to facilitate conversation. To ensure that the research schedule was used for enquiry while facilitating conversation, the areas of questioning were phrased in an everyday language different from the research questions, while at the same time ensuring that they produce the information required to answer the research questions.

### c) Phase three: Receiving feedback on the interview schedule

The interview schedule was submitted to the supervisor to review and examine it for structure, length, writing style and comprehension. A close reading of the schedule by the researcher's colleagues was also done to examine the tool for items mentioned earlier. The feedback helped the researcher determine how the participants would understand interview questions and whether their understanding would be close to what the researcher expected. The feedback was used to enhance the reliability of the interview schedule (Castillo-Montoya 2016:824).

### d) Phase four: Piloting/pre-testing the interview schedule

The interview schedule was pre-tested with two facility managers from different facilities who were not part of the study participants. The actual interview was

simulated in a real setting, starting by establishing rapport, obtaining consent, conducting the interview in a private space, and recording and timing the interview. At the end of the interview, each participant was asked to comment on the nature, clarity and their understanding of areas of questioning. The researcher was also able to assess whether the questioning areas would yield the information required to answer the research questions. The interviews lasted 40 minutes to an hour. All information was used in the final revision of the interview schedule. The interview guide was pretested in January 2019. According to Merriam (2009 in Castillo-Montoya 2016:827), piloting the interview schedule is the best way to tell whether the arrangement and phrasing of your questions work or not.

#### 3.6.3.2 The interview process

The appointment for interviews was arranged with facility managers telephonically and confirmed through emails. The study's purpose was clearly explained to the facility managers, and the research proposal, ethics clearance and permission letters were sent to the facility managers through email prior to the interviews. On arrival at the facility on the day of the interview, the researcher introduced herself and requested that the interview be conducted in a private place. The facility manager selected a suitable area for the interview and a "do not disturb sign" was put on the door to ensure privacy and prevent interruptions. Telephones were redirected to other offices and cellphones were switched off. The purpose of the interview, the role of the interviewer, and the estimated time for the interview were clearly explained to the facility manager. The facility managers were made to feel at ease by explaining that all information obtained during the interview would be kept confidential. They were also informed about the need to audio-record the interview and gave their permission.

Informed consent was obtained after facility managers and the researcher both signed the consent form. The participants were also informed about their right to withdraw or stop the interview at any time if they felt uncomfortable. The researcher established rapport by showing interest in what was said and listening attentively throughout the interview. Facility managers were encouraged to talk freely and were given the freedom to state their experiences, challenges and recommendations regarding the topic being discussed.

Open and probing questions were asked, and follow-up questions arose during the interview. Moreover, field notes were taken during the interview to ensure the availability of data and to prevent loss of information. According to Greeff (2017:359), field notes are written accounts of the things the researcher hears, sees and thinks about during the interview. The interview was also audio recorded to allow a fuller record of information, which was used for transcribing the information at a later stage.

At the end of the interview session, the researcher summarised the major points and allowed the facility managers to ask questions. The researcher asked facility managers whether they could be contacted again at a later stage if additional questions arose or to verify her interpretation of the information**.** The interviews took 45 minutes to an hour. All participants agreed to be contacted later if the need arose. All participants were thanked for their availability and participation. Three participants were contacted at a later stage for follow-up interviews because more information was needed to enrich the data. Follow-up interviews were conducted face-to-face. The follow-up interview was similar to the initial interview process. Data collection took place until saturation was reached, from March to June 2019.

### 3.6.4 Data analysis

Qualitative data analysis occurred simultaneously with data collection. Nieuwenhuis (2017:109) describes qualitative data analysis as an ongoing and iterative process, meaning that data collection, processing, analysis and reporting are interlinked. It is further described as a process of describing certain objects or observations through reasoning and argumentation that is not based on statistical relations between variables (Henning, van Rensburg & Smit 2017:127). Individual interview data were collected and analysed through coding and categorisation. Data were organised into smaller components and examined for differences and similarities by grouping them into themes. The data analysis process went through the following steps, as described by Nieuwenhuis (2017:114):

### 3.6.4.1 Preparation of data

The initial step in data analysis was to describe the participants in detail and the context in which the study was conducted. The description included the number of participants, selection process, their gender and educational level. In this study, all eligible participants were selected, and 11 facility managers were interviewed in their respective facilities. The study included one male and 10 female facility managers.

Each participant was given an identification number, and all data obtained from that participant was identified in the same manner (e.g. participant 1). According to Creswell and Creswell (2018:316), data preparation also involves the transcription of interviews, typing field notes, and arranging data according to the source. Audio recordings from each participant were transcribed verbatim, and non-verbal cues were included in the transcripts. The researcher went through the transcripts and audio recordings several times to develop a greater understanding of the data. All impressions developed about the data were recorded.

### 3.6.4.2 Coding of the data

Data from the text in the transcripts were divided into distinctive, meaningful units through coding. Nieuwenhuis (2017:119) defines coding as indicating a portion of data with symbols, descriptive words, or identifying names. Creswell and Creswell (2018:316) and Polgar and Thomas (2020:151) concur that coding is the process of organising data by grouping text into categories based on the similarity of words.

The codes were grouped into categories according to their similarities and differences, and the meaning that merged from the categories. Categories were labelled based on the terms from the literature and the information obtained from participants. The categories were merged to form appropriate sub-themes. Subthemes were then merged to form themes. The themes were presented as the significant findings of the qualitative phase. According to Gray and Grove (2021:810), themes are concepts related to the study that the researcher discovers during data collection and analysis. Coding was done manually by the researcher with assistance from the supervisor.

Details regarding data analysis and the findings from the interviews are presented in Chapter 5.

### 3.6.5 Measures to enhance the trustworthiness of the study

The researcher enhanced the trustworthiness of the study by applying four of Lincoln and Guba's criteria of trustworthiness, namely credibility, confirmability, dependability and transferability (Nieuwenhuis 2017:123; Schurink, Fouché & de Vos 2017:419).

**Credibility** refers to the confidence in the reality of the data and its interpretations (Polit & Beck 2021:569). The credibility of the study was ensured through triangulation of qualitative and quantitative data. The adoption of a mixed-method design was found to be suitable for answering the research questions, as an evaluation of the RHIS required consideration of all factors involved in data generation processes which required both narrative and statistical data. There was prolonged engagement with participants by asking questions until data saturation was reached. Prolonged engagement promotes trust and rapport, which helps the researcher obtain accurate and rich information (Polit & Beck 2021:571). It also assisted the researcher in developing an in-depth understanding of the phenomenon under study (Brink et al 2018:158). Persistent rereading of transcribed data was undertaken to get an understanding of the phenomenon from the perspective of the participants.

To ensure **confirmability**, the study's findings should reflect the participants' voice, phrasing, and the conditions of the inquiry, not the biases, motivations, or perspectives of the researcher (Polit & Beck 2021:570). Reflexivity was applied by identifying the researcher's personal values, previous background and experiences that could affect data collection, analysis and the interpretations of the results (Polit & Beck 2021:571). The researcher created a reflexive diary that was used to record and reflect on thoughts and previous experiences about the phenomenon. The reflections enabled the researcher to probe deeply and grasp the facility managers' experiences from their perspectives (Polit & Beck 2021:571). The researcher reproduced sufficient text from the transcripts to allow the reader to decide what the participants were trying to convey. All interviews were recorded to ensure an audit trail of raw data.

According to Polit and Beck (2021:569), **dependability** refers to the "stability of data over time and conditions". The study's dependability was increased by clear documentation of the research design and implementation process of the study. The data analysis process was also documented to allow the reader to have an understanding of how the researcher arrived at the interpretations. Interpretations were made in consultation with the supervisor. Moreover, data were collected from three different sources using different data collection methods to facilitate a greater understanding of how the RHIS is used to produce quality reproductive health data and how it facilitates evidence-based decision-making.

Nieuwenhuis (2017:124) argues that **transferability** does not mean generalisation of the results, but allows the reader to make their own decisions regarding the transferability of the results to other settings. The researcher thus provided a detailed description of the study's design, setting and participants to allow the reader to draw conclusions about the transferability of the results to other settings.

## 3.7 INTEGRATION OF THE QUANTITATIVE AND QUALITATIVE RESULTS

Integration is described as a deliberate process whereby the researcher brings together the quantitative and qualitative findings in a study to create a holistic understanding of a phenomenon being investigated (Fetters & Molina-Azorin 2017:293; Guetterman, Fetters & Creswell 2015:554; Richards, Bazeley, Borglin, Graig, Emsley, Frost et al 2019:1). The results were integrated in an explanatory sequential design to connect the quantitative and the qualitative phase in order for the qualitative phase to provide a robust explanation of the results obtained from the initial quantitative phase (Creswell & Plano Clark 2017:234).

Integration can occur at several stages in a mixed-method study, including at the design level, method level, or interpretation level (Berman 2017:7; Creswell & Plano Clark 2017:234). In this study, integration took place at the interpretation level, which was aimed at obtaining complementarity and completeness of the findings to effectively evaluate the performance of the RHIS in generating quality reproductive health information. Complementarity is described as integrating two differently connected but not conflicting responses to answer a research question by using both

quantitative and qualitative approaches (Fetters & Molina-Azorin 2017:302; Fiorini, Griffiths & Houdmont 2016:38). The complementary process was used to merge quantitative and qualitative data to gain comprehensive information. Bazeley (2019:71) asserts that complementary processes in mixed-method research combine the information from different sources into a comprehensible whole.

The complementarity of the findings in this study was displayed using a joint display integration process. This is a visual display of both quantitative and qualitative findings utilising a table or a figure to compare and develop new insight into the findings and meta-inferences (Guetterman et al 2015:555; McCrudden & McTigue 2019:396; Richards et al 2019:2). Furthermore, a joint display facilitates the detection of both similarities and differences across the information obtained from different sources (Bazeley 2019:74). Creswell and Plano Clark (2018:237) asserts that the interpretation of mixed methods results in an explanatory sequential design should indicate how the qualitative results provide a deeper understanding of the quantitative findings. The integration of quantitative and qualitative results provided a complete and in-depth understanding of the performance of the RHIS in managing reproductive health information.

## 3.8 RESEARCH METHODS FOR PHASE THREE (DELPHI SURVEY)

### 3.8.1 Population

The Delphi survey population were health information managers, monitoring and evaluation managers, reproductive health programme managers, facility managers, capacity-building coordinators from the South African NDoH, Gauteng DoH, and Tshwane District Health Office, City of Tshwane Metropolitan Municipality and NGOs supporting the district. These managers were considered experts because of their experience in data management, reproductive health programme management, and capacity building. Furthermore, each was considered relevant because of the diverse scope of the strategies, which covered the national, provincial and district level.

Experts are a group of well informed, knowledgeable individuals and specialist in their field. Health information managers are responsible for the monitoring and management of the RHIS to ensure that it is used to produce quality and reliable data.

Reproductive health managers are responsible for monitoring the performance of reproductive health programmes by using data produced by the RHIS. Capacity-building/training managers ensure that facility managers and HCPs are capacitated on data management and reproductive health services. The monitoring and evaluation directorate monitors all health programmes' performance in the districts, utilising the RHIS-produced data and data from other health information sources.

The NGOs consisted of a group of RHIS specialists responsible for capacitating and supporting the district with resources, including in the development of data collection tools, improvement of the RHIS, training of health information and programme managers, and providing technical staff to assist the facilities with data management issues. Finally, facility managers are responsible for running the facilities, while ensuring that the health care services are provided appropriately and data are managed correctly.

### 3.8.2 Sampling method and procedure

A non-probability purposive sampling method was adopted for the Delphi survey. Maree and Pietersen (2017:198) argue that purposive sampling is used in a special situation where there is a specific purpose in mind. The purpose of the sampling criteria was to select reproductive health data management experts from the different levels of the health care system. The aim was to ensure that the panel consisted of a heterogeneous group of experts to seek the representation of all experts involved in reproductive health data management at different levels of the health care system (the national, provincial, district level and facility level). Health and reproductive HIM experts in the district were thus invited to participate, including HIM officers, monitoring and evaluation officers, reproductive health programme managers, and NGOs supporting the district (e.g. Health System Trust, Health Information System Program, Foundation for Professional Development & MEASURE Evaluation SIFSA).

The names and contact details of managers responsible for HIM, reproductive health programmes, capacity building, and NGOs supporting the district with HIM were sought through the snowballing sampling technique to select the sample. This technique is used to identify participants who knew other potential participants who

can provide essential information about the phenomenon under study (Gray & Grove 2021:430). The study did not explore sensitive information or pose a risk to the participants; hence, the researcher sought prospective participants' contact information. The researcher contacted the facility managers to request the names of the district personnel involved in data management. The district personnel were contacted, and they offered the names of the managers at the provincial level and NGOs supporting the district. The provincial managers offered the names of the managers at the national level.

Identified experts were contacted telephonically, and an explanation was given about the purpose of the study and the Delphi process. Following the telephonic invites, an email containing the invitation letter (see Annexure I) and the consent form (see Annexure J) was sent to the experts. The sample consisted of 16 experts in total; two from the national office, two from the provincial office, four from the district office, five from the City of Tshwane Metropolitan Municipality, one facility manager and three experts from the NGOs.

#### 3.8.2.1 Inclusion criteria

- The participants had to have two or more years' experience working as either a health information manager, monitoring and evaluation manager, reproductive health programme manager, health information specialist, capacity-building managers or facility manager.
- Be employed by either the NDoH, Gauteng Department of Health, Tshwane District Health Office, City of Tshwane Metropolitan Municipality or NGOs supporting the Tshwane District Health Office.

#### 3.8.2.2 Exclusion criteria

- Health information managers, monitoring and evaluation managers, reproductive health programme managers, health information specialists, capacity-building managers and facility managers with less than two years' experience in the position were excluded from the study.

- Managers employed in private organisations were excluded from the study.

### 3.8.3 Development of strategies

As discussed in Section 3.2.4, the researcher used the meta-inference of phase one and two's findings and the literature to develop draft strategies. The meta-inference provided an understanding of the performance of the RHIS in managing reproductive health information. Challenges with its performance were identified, and the existing literature and expert opinions were sought to support the development of strategies for improving reproductive health data management.

#### 3.8.3.1 Delphi data collection and analysis

The Delphi method is a structured process that involves the collection and aggregation of expert opinions (Polit & Beck 2017:244). Information was obtained from a group of experts through a virtual meeting and questionnaires, and each round was refined based on the feedback from respondents on a previous version. Data collection and analysis were repeated until consensus was reached in round two.

##### 3.8.3.1.1 Round one

All individuals who consented to take part in the study were invited to a virtual meeting via email. The virtual meeting was held with 16 experts using the Microsoft Teams meeting applicator. The aim of the meeting was to present the study's findings and outline the key areas that needed interventions. The participants made contributions to each key area.

The contributions included specific activities required for each strategic action. Those were consolidated into a questionnaire to seek final consensus. The duration of the meeting was 75 minutes.

#### 3.8.3.1.2 Round two

In round two, the researcher developed a questionnaire consisting of strategies. The questionnaire was circulated to 16 experts via email. The questionnaire did not require true identifiable information to maintain the anonymity and confidentiality of the experts. The experts were given 15 days to complete and return the questionnaire to the researcher. Reminder emails were sent after 10 and 14 days. Those who did not respond after 15 days were sent one more reminder on day 17. Those who did not respond after 20 days were excluded from this round. In the end, 10 experts participated in the second round. The degree of consensus reached on specific elements was documented and the results were sent to the participants.

### 3.8.3.2 Data collection instruments

In round one, the researcher used a notepad to record the experts' suggestions and recommendations. The Microsoft Teams applicator was used to record the meeting. The questionnaire for the second round contained demographic questions and the proposed strategies (see Annexure K). The strategies included specific actions and activities to be performed in order to meet the strategic outcomes. The responsible units/person and the time frame for each strategy were also included. Likert-scale questions were presented for experts to rate their level of agreement and disagreement with each strategic action and activities. The scoring for the Likert scale was based on a four-point scale, namely 1-strongly agree, 2-agree, 3-disagree, and 4-strongly disagree. The scale omitted the neutral middle option because the researcher only required options to agree or disagree with the strategies, which were necessary for the validation of the strategies.

### 3.8.3.3 Data analysis

Round two generated quantitative data, which were analysed by a statistician using the SPSS statistical software package. Descriptive statistics were utilised to calculate the frequencies of responses and percentages of the entire data set. Consensus was predefined as ≥ 70 of the sum of strongly agree and agree responses as obtained from the experts' rating, which is the total agreeable percentage. A strategy with a score

below 70% was not included in the final strategies. Literature affirms that, while there is no accepted standard for the target percentage agreement, 70% or higher on the summative of agree and strongly agree is considered appropriate (Stewart et al 2017:4; Zelmer et al 2018:5).

## 3.9 ETHICAL CONSIDERATIONS

Strydom (2017:114) defines ethics as a set of moral principles which offers rules and behavioural expectations about the most correct conduct towards individuals or a particular group of people. Researchers are expected to internalise ethical principles in their personality, to such an extent that ethically guided decision-making becomes part of their lifestyle (Strydom 2017:115). In this study, the researcher upheld the following ethical principles:

### 3.9.1 Permission to conduct the study

According to Pera, van Tonder and van der Wal (2018:379), the researcher must obtain permission to conduct research from the authorities in charge of health institutions prior to data collection. The researcher protected the rights of the institution by requesting permission to conduct the study from the Research Committee of the Tshwane Health and Social Development Department and Health Studies Research and Ethics Committee of UNISA. The study was only conducted after both committees granted approval. The study would benefit the Tshwane district health service because it explored how the RHIS is used to generate reliable and quality data, and how the reproductive data are used in evidence-based decision-making. Consequently, strategies for effective data management were developed.

### 3.9.2 Protecting the rights of the participants

The respondents were selected freely based on the topic under study. The respondents' right to autonomy, justice, anonymity, confidentiality, beneficence and informed concerned were protected throughout the study.

#### 3.9.2.1 Autonomy

Grey and Grove (2021:195) state that research subjects are autonomous agents; therefore, they should be allowed to decide voluntarily whether to participate after being informed about the proposed study. Furthermore, research subjects should be allowed to participate freely in the research without external control, coercion or exploitation (Pera et al 2018:376). Respondents and participants in this study were given an opportunity to decide whether to take part in this study without being threatened. They were informed of their right to ask questions, refuse to give information, or to withdraw from the study at any time.

#### 3.9.2.2 Justice

The principle of justice means that all respondents and participants should be treated in an impartial, fair and just manner (Dhai & McQuoid-Mason 2016:32). It also includes the right to fair treatment and privacy.

##### 3.9.2.2.1 Right to equal and fair treatment

Dhai and McQuoid-Mason (2016:175) state that the selection and recruitment of respondents and participants should be fair and just, based on scientific and ethical principles. In this study, participants were selected fairly based on the study's objectives, not because they were vulnerable or the researcher liked them. They were treated the same, and no favours were offered for taking part in the study (Gray et al 2017:172).

##### 3.9.2.2.2 Privacy

Privacy is an individual's right to decide the time, amount of information and other circumstances under which personal information may be shared with or withheld from others (Gray & Grove 2021:203). In order to protect respondents' and participants' right of privacy, they were asked to complete questionnaires privately. Individual interviews were conducted in private rooms. The security and privacy of raw data were protected by passwords. For record reviews, the names of the documents (reports)

and the findings regarding specific observations were not linked to any specific facility when reporting on the findings. Moreover, no report was taken from the facility.

#### 3.9.2.3 Anonymity

Anonymity means that no one, not even the researcher, should be able to identify the participants after the study (Strydom 2017:120). In addition, the researcher should not be able to link the data collected to any participant (Pera et al 2018:378). In order to ensure anonymity, the data collection tools did not contain any identifiable information; instead, a research number was assigned to each data collection tool. A name list of facilities and their code number was kept in a locked place, separate from the completed raw data. Consent forms were not stapled together with the data tools and were kept safe at different locations.

Complete anonymity was not possible with interviews because the researcher knew the majority of the facility managers. The researcher thus signed a confidentiality pledge (see Annexure G) assuring the participants that information obtained would not be divulged in a manner that identifies them (Polit & Beck 2020:141). Participants' true names were not mentioned during the interviews since the interviews were audio recorded for later transcription.

#### 3.9.2.4 Confidentiality

Confidentiality refers to the researcher's management of information shared by respondents and participants, and protecting private information from being divulged without their permission (Gray & Grove 2021:205). All completed questionnaires, checklists, and interview transcripts were kept secure and out of reach of anyone not involved in the study. No clinic staff had access to the completed questionnaires, and all information was kept confidential by the researcher.

#### 3.9.2.5 Beneficence and non-maleficence

Beneficence refers to the principle of minimising harm and maximising possible benefits (Strydom 2017:116). The study caused no physical harm and emotional harm

and discomfort were prevented by assuring the respondents and participants that information provided would not be used against them. Moreover, respondents and participants were informed about their right to withdraw from the study if they felt uncomfortable. No questions induced any psychological disturbance or anxiety in the participants. The study will assist HCPs, facility managers, health information managers and reproductive health programme managers in identifying factors affecting the quality and use of reproductive health information. The strategy will assist them in improving the system's overall operation.

#### 3.9.2.6 Informed consent

Dhai and McQuoid-Mason (2016:169) argue that research on a living person should be conducted in a prescribed manner with written consent from the person only after they have been informed about the objects of the research, including any possible negative or positive consequences of the research.

Participants and respondents were employees of the Gauteng Department of Health, Tshwane district, and aged above 18 years. They were informed about the purpose of the study, data collection procedures, nature of commitment, and the potential risks and benefits of the study. This information was provided verbally and in the form of an information leaflet attached to the consent form. The researcher assumed consent when the consent form was signed, and questionnaires were returned. Recruitment to the interview commenced with a detailed explanation of the title, purpose, and data collection methods, including participants' rights. Participants also had an opportunity to ask questions for clarification before they were given consent forms to sign. The interview commenced after the consent form was signed.

### 3.9.3 Dissemination of findings

A completed research report and published articles form the basis of communicating the efforts and various procedures used in the research. Without any communication of the findings there will be no indication that the research has been conducted and no one will benefit from its findings (Strydom & Delport 2017:277). This study's findings will be disseminated to the Tshwane Research Committee, UNISA, and all facilities

that took part in the study through a written research report. Findings will be further disseminated worldwide through the publication of articles in an accredited journal and presentations at different conferences.

### 3.9.4 Scientific integrity of the study

The researcher's scientific integrity must be incontrovertible, and research data should not be falsified or fabricated (Gray et al 2017:185; Pera et al 2018:383). The researcher upheld all ethical principles and scientific research methods throughout the study. The information and findings reported in this study were not falsified or fabricated; the results were reported as they were obtained without any distortion, and no relevant information was omitted.

## 3.10 SUMMARY

This chapter described the research design and methodology, including the target population, sample, sampling, data collection, data collection instrument, data analysis and ethical considerations of the study.

In the next chapter, the data analysis and quantitative results of the study are presented.

# CHAPTER 4
# DATA ANALYSIS AND PRESENTATION OF QUANTITATIVE RESULTS

## 4.1 INTRODUCTION

Chapter 3 discussed the research methodology undertaken in the study. This chapter presents the quantitative results based on the data analysis discussed in Chapter 3. A sequential explanatory mixed-method design was employed to evaluate the performance of the RHIS in generating quality routine reproductive health information in the Tshwane district. The objectives of the quantitative approach were to:

- Determine how the RHIS is used to produce reliable and quality routine reproductive health data.
  - Sub-objectives:
    - To explore HCPs' understanding of reproductive health data management.
    - To determine HCPs' perceived confidence in performing reproductive health information management tasks.
    - To examine HCPs' views regarding the organisational factors influencing reproductive health data management tasks.
    - To establish HCPs' views regarding the usability of the data collection tool.
- To assess the quality of reproductive health data at the facility.

Data from questionnaires and checklist were entered into a spreadsheet and cleaned before being analysed using the SPSS program for windows. A statistician supported the analysis, and this included descriptive and inferential statistics. The results are divided into three sections. Section 4.2 provides relevant descriptive and multivariate statistical findings on the use of the RHIS in generating relevant, reliable and accurate data. Section 4.3 presents findings on data quality assessment in terms of availability, accuracy, completeness and timeliness, while Section 4.4 provides a conclusion.

## 4.2 FINDINGS ON THE USE OF THE RHIS IN GENERATING RELIABLE AND QUALITY REPRODUCTIVE HEALTH DATA

### 4.2.1 Section A: General information

This section reports on respondents' socio-demographic profiles. The data include their gender, age, highest educational level, working position in the health facility, and duration of employment in the position. This section also covers the respondents' training on the RHIS and reproductive health. The final analysed dataset was derived from all 111 duly completed questionnaires.

#### 4.2.1.1 Respondents' socio-demographic information

**Table 4.1: Respondents' demographic profiles**

| Variables | | Count (n) | Proportion (%) |
|---|---|---|---|
| Gender | Male | 18 | 16.2% |
| | Female | 93 | 83.8% |
| Age group | 29-29 years | 15 | 13.5% |
| | 30-39 years | 47 | 42.3% |
| | 40-49 years | 35 | 31.5% |
| | 50-59 years | 11 | 9.9% |
| | 60-69 years | 3 | 2.7% |
| Highest educational level | Master's degree | 1 | 0.9% |
| | Bachelor's degree | 31 | 27.9% |
| | Diploma | 66 | 59.5% |
| | Certificate | 13 | 11.7% |
| Working position at the facility | Medical Officer | 6 | 5.4% |
| | Professional Nurse | 92 | 82.9% |
| | Enrolled Nurse | 13 | 11.7% |
| | Other | 0 | 0.0% |
| Duration employed in the position | 0-4 years | 26 | 23.4% |
| | 5-9 years | 23 | 20.7% |
| | 10-14 years | 34 | 30.6% |
| | 15-20 years | 25 | 22.5% |
| | > 20 years | 3 | 2.7% |

The results presented in Table 4.1 reveal that the majority (83.8%; n=93) of respondents were females, while the remaining 16% (n=18) were males. Concerning the age group, the majority (42.3%; n=47) of the respondents were aged between 30 and 39 years, followed by 31.1% (n=35) who were aged between 40 and 49 years,

13.5% (n=15) were aged between 20 and 29 years, 9.9% (n=11) were aged between 50 and 59 years, and 2.7% (n=3) were between 60 and 69 years old. In terms of highest educational qualifications, the majority (59.5%; n=66) of respondents reported that they held a diploma at the time the survey was conducted, followed by 27.9% (n=31) who had Bachelor's degrees, while 11.7% (n=13) had a certificate. Only 0.9% (n=1) had a master's degree.

The largest proportion of 82.9% (n=92) of respondents was employed as professional nurses at the facilities, 11.7% (n=13) were employed as enrolled nurses, while 5.4% (n=6) were employed as medical officers. Concerning the duration of their employment in their current position, 23.4% (n=26) had a maximum of four years in the position, 20.7% (n=23) were five to nine years in their current position, 30.6% (n=34) were in their current position 10 to 14 years, 22.5% (n=25) were in their current position 15 to 20 years, while only 2.7% (n=3) were in their current position more than 20 years.

#### 4.2.1.2 Routine Health Information System (RHIS) training

The respondents were asked to indicate whether they attended three- to five-days' training on the RHIS. The question aimed to determine whether HCPs were equipped with the necessary skills required to enable them to collect relevant, reliable, and accurate reproductive health data.

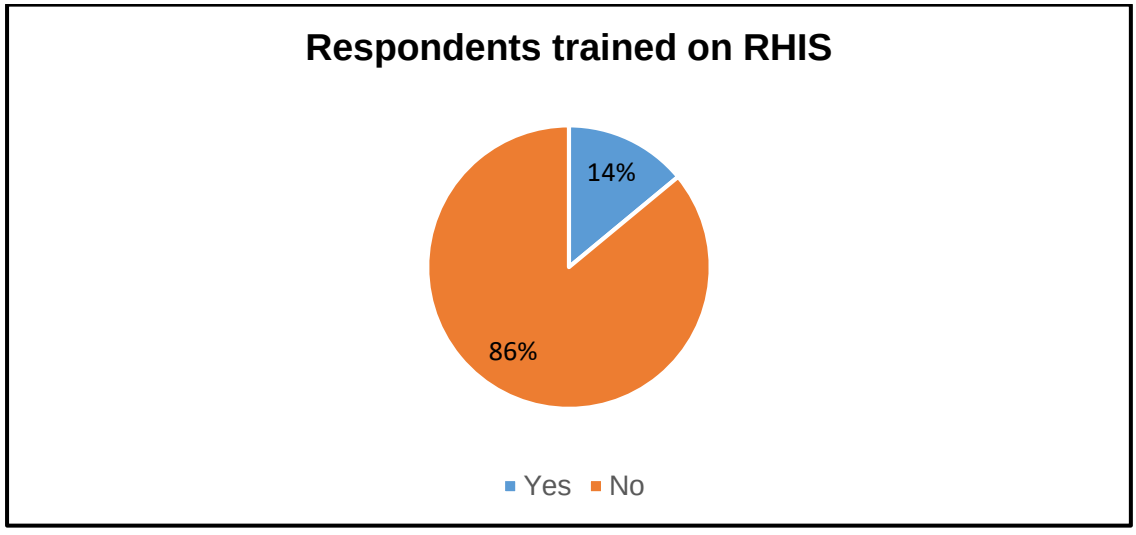


**Figure 4.1: Respondents trained on RHIS**

Figure 4.1 indicates that of the respondents, 86% (n=96) reported that they had not attended a three- to five-day RHIS training programme, while only 14% (n=15) reported that they had attended this training.

#### 4.2.1.3 Respondents trained on reproductive health

The respondents were asked to indicate whether they had attended five days of reproductive health training. The question aimed to determine whether HCPs were equipped with the necessary skills required to monitor and evaluate reproductive performance using the RHIS.

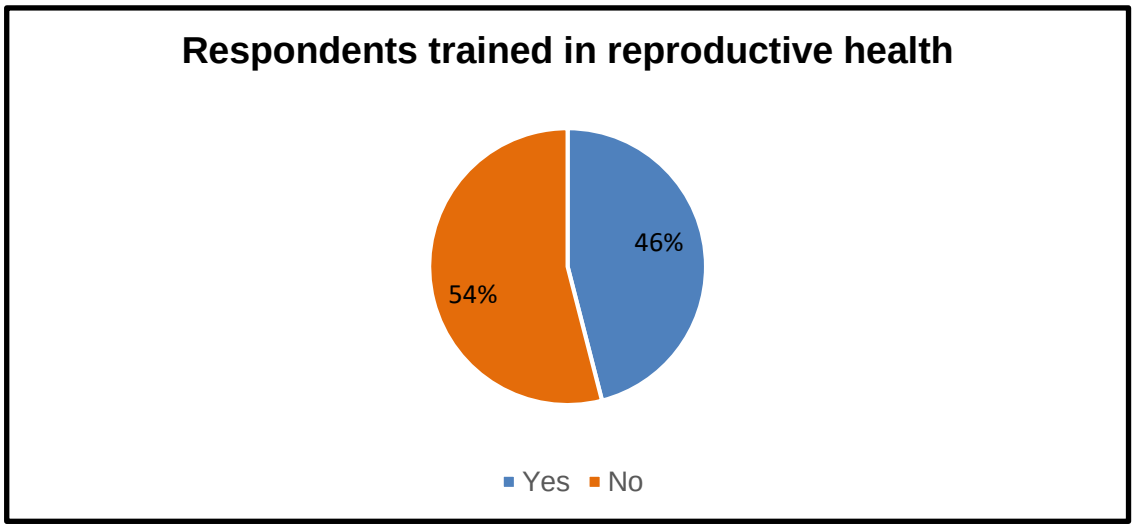


**Figure 4.2: Respondents trained in reproductive health**

Figure 4.2 indicates that of the respondents, 54% (n=60) reported that they had not attended five days' training on reproductive health, while 46% (n=51) reported that they had attended the training.

### 4.2.2 Section B: Health care providers' understanding of reproductive health data management

This section presents relevant descriptive and frequency statistics results of the items under each of the dimensions developed to assess HCPs' understanding of reproductive health data management. It included the recording of reproductive health data on the RHIS tool, and their understanding of facility reporting requirements.

#### 4.2.2.1 Recording of reproductive health data elements

Respondents were asked to select the age group of patients for which they recorded reproductive health services as a measure to assess their understanding of the recording of reproductive health data elements.

**Table 4.2: Recording of reproductive health data elements**

| Service offered | Age group | Count (n) | Proportion (%) |
|---|---|---|---|
| Oral pill cycle issued | Below 15 years | 4 | 4% |
| | 15-49 years | 34 | 31% |
| | All age groups | 73 | 66% |
| Medroxyprogesterone injection administered | Below 15 years | 2 | 2% |
| | 15-49 years | 32 | 29% |
| | All age groups | 77 | 69% |
| Norethisterone enanthate injection administered | Below 15 years | 3 | 3% |
| | 15-49 years | 30 | 27% |
| | All age groups | 78 | 70% |
| Subdermal implant inserted | Below 15 years | 0 | 0% |
| | 15-49 years | 34 | 31% |
| | All age groups | 77 | 69% |
| Intrauterine device (IUD) inserted | Below 15 years | 0 | 0% |
| | 15-49 years | 35 | 32% |
| | All age groups | 76 | 68% |
| Sterilisation performed on man or woman | Below 15 years | 0 | 0% |
| | 15-49 years | 25 | 23% |
| | All age groups | 86 | 77% |
| Male condoms issued | Below 15 years | 0 | 0% |
| | 15-49 years | 11 | 10% |
| | All age groups | 100 | 90% |
| Female condoms issued | Below 15 years | 0 | 0% |
| | 15-49 years | 15 | 14% |
| | All age groups | 96 | 86% |

The results in Table 4.2 show respondents' recording of reproductive health services on the RHIS tool when such services were offered to patients in the indicated age groups. Frequencies show that the majority (66%; n=73) of respondents recorded all age groups on the RHIS when issuing them with oral pill cycles, 31% (n=34) recorded only for patients aged between 15 and 49 years, while 4% (n=4) recorded only for patients younger than 15 years old.

The majority of 69% (n=77) and 70% (n=78) of respondents indicated that they recorded that Medroxyprogesterone and Norethisterone Enanthate injections were administered when the services are offered to women of all age groups, respectively. While 29% (n=32) and 27% (n=30) of respondents recorded only based on patients aged between 15 and 45 years who were administered with Medroxyprogesterone and Norethisterone Enanthate injections, respectively. Only 2% (n=2) and 3% (n=3) of respondents recorded only on patients aged below 15 years who were administered with Medroxyprogesterone and Norethisterone Enanthate injections, respectively.

Correspondingly, the majority of 69% (n=77) and 68% (n=76) of respondents indicated that they recorded on all age groups who were inserted with subdermal implants and IUCDs, respectively; 31% (n=34) and 32% (n=35) of respondents recorded only on patients aged between 15 and 49 years, respectively. No respondents recorded patients aged 15 years and below who were inserted with either a subdermal implant or IUCD.

The majority (77%; n=86) of respondents indicated that male or female sterilisation are recorded on the RHIS when it is performed on patients of all age groups, while 23% (n=25) indicated that sterilisations are recorded on the RHIS when performed on patients aged between 15 and 49 years. Regarding male and female condoms being issued, 90% (n=100) and 86% (n=96) indicated that male and female condoms are recorded on the RHIS when issued to patients of all age groups, respectively. Only 10% (n=11) of respondents indicated that male condoms are recorded on the RHIS when issued to patients aged between 15 and 49 years, and 14% (n=15) recorded this information when female condoms were issued to patients aged between 15 and 49 years. No respondents recorded on the RHIS when they issued patients aged 15 years and younger with male or female condoms.

On average, 68.4% (n=76) and 1.8% (n=2) of respondents in the study indicated that oral pill cycles that are issued, Medroxyprogesterone injections, Norethisterone enanthate injections, IUCDs and subdermal implants are recorded on the RHIS when the service is offered to patients of all age groups and patients aged below 15 years,

respectively. According to the NDoH (2016:108,109), the services mentioned above are only recorded when offered to patients aged 15 to 49 years.

The results show that the majority (average of 70.2%) of respondents in this study did not understand the recording of some reproductive data elements. However, an average of 80.2% of respondents understood the age groups for which to record sterilisations being performed, as well as female and male condoms being issued. According to the NDoH (2016:109,110), the data elements indicated above are recorded on the RHIS when the service is offered to all age groups.

#### 4.2.2.2 Exploratory factor analysis: Recording reproductive health data elements

**Table 4.3: Recording reproductive health data elements**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Factor** | **Initial Eigenvalues** | | | **Extraction Sums of Squared Loadings** | | | **Rotation Sums of Squared Loadings** | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 4.895 | 61.190 | 61.190 | 4.599 | 57.486 | 57.486 | 2.895 | 36.186 | 36.186 |
| 2 | 1.261 | 15.766 | 76.956 | 1.047 | 13.084 | 70.570 | 2.751 | 34.384 | 70.570 |
| 3 | .750 | 9.373 | 86.329 | | | | | | |
| 4 | .482 | 6.022 | 92.351 | | | | | | |
| 5 | .227 | 2.839 | 95.190 | | | | | | |
| 6 | .178 | 2.222 | 97.412 | | | | | | |
| 7 | .158 | 1.978 | 99.390 | | | | | | |
| 8 | .049 | .610 | 100.000 | | | | | | |
| Extraction Method: Alpha Factoring. | | | | | | | | | |

EFA was computed and demonstrate the presence of two initial eigenvalues greater than 1; hence, two factors were extracted from selected items in the dataset for the dimension measuring “healthcare providers’ understanding of the recording of reproductive health data elements”. Beavers et al (2013:7) describe an eigenvalue as a “value associated with each factor describing the amount of variance in the items that can be explained by that factor”. Based on the **rotated sums of squared loadings**, about 70.5% of the total variance in the dataset for the relevant construct was accounted for by two factors. From the total 70.5% variance, factor 1 individually

accounted for 36.1%, while factor 2 accounted for 34.3% of the variance (Ganyaupfu 2018:n.p.). The two factors were retained because their eigenvalues were greater than 1, since Beavers et al (2013:7) and Nagitta (2019:99) claim factors should be retained if their eigenvalues are equal to or greater than 1.

To clarify, simplify and facilitate the interpretation of factor analysis, a Varimax rotation transformation method was conducted. Varimax rotation is an orthogonal rotation method undertaken in a study where there is an intension to maintain the independence of the factors, assuming that the factors in the analysis are uncorrelated (Polit & Beck 2017:343; Osborne et al 2015:3). The minimum factor loading cut off point of this study was 0.5. All items in this section met the minimum factor loading of 0.5 and were retained. The rotation revealed factors that were correlated when assessing HCPs' understanding of the recording of reproductive health data elements. Two factors were specified, and an inspection was conducted of the item loadings on each factor; results are presented in Table 4.4.

**Table 4.4: Recording of reproductive health data elements**

| Rotated Factor Matrix | | |
|---|---|---|
| | Factor | |
| | 1<br>Short-acting contraceptive methods | 2<br>Long-acting and barrier contraceptive methods |
| B08.Oral_pill_cycle | .707 | .297 |
| B09.Medroxyprogesterone_injection | .971 | .229 |
| B10.Norethisterone_enanthate_injection | .895 | .278 |
| B12.IUD_inserted | .455 | .599 |
| B13.Sterilisation_performed | .255 | .693 |
| B14.Male_condom_issued | .211 | .807 |
| B15.Female_condom_issued | .204 | .837 |
| Extraction Method: Alpha Factoring. Rotation Method: Varimax with Kaiser Normalisation. | | |
| a. Rotation converged in 3 iterations. | | |

In terms of factor 1, three items were confirmed as loading onto a single factor with the factor loadings ranging from 0.70 to 0.97 and a mean loading of 0.857. The oral pill cycle, Medroxyprogesterone injection and Norethisterone enanthate injection had a loading of 0.707, 0.971, and 0.895, respectively. The three items loaded on factor 1 were termed 'short-acting contraceptive methods' since the items are related to SARC

methods which are recorded only when the service is offered to women aged between 15 and 49 years.

Concerning factor 2, four items were confirmed as loading to a single factor, with factor loadings ranging from 0.59 and 0.83, and a mean of 0.734. On IUCDs inserted, sterilisations performed, male condoms issued and female condoms issued, a correlation of 0.599, 0.693, 0.807 and 0.837 with factor 2 was found, respectively. The four items loaded on factor 2, which was named “long-acting and barrier contraceptive methods” because the items were related to the long-acting and barrier contraceptive methods that are recorded when the service is offered to men and women of all age groups. According to Polit and Beck (2017:344), factors can be named by inspecting the common themes that link the items together.

#### 4.2.2.3 Relationship between the recording of reproductive health data elements and RHIS training

Table 4.5 presents the relationship between the ***recording reproductive health data elements*** and attending three- to five-days of RHIS training.

**Table 4.5: Recording of reproductive health data elements and RHIS training: cross-tabulation**

| Recording of reproductive health data element and RHIS training cross-tabulation | | | | | |
|---|---|---|---|---|---|
| | | | Attended 3-5 days RHIS training | | Total |
| | | | Yes | No | |
| Oral pill cycle | Below 15 years | Count (%) | 0 (0.0%) | 4 (3.6%) | 4 (3.6%) |
| | 15 – 49 years | Count (%) | 8 (7.2%) | 26 (23.4%) | 34 (30.6%) |
| | All age groups | Count (%) | 7 (6.3%) | 66 (59.5%) | 73 (65.8%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| Medroxyprogesterone injection | Below 15 years | Count (%) | 0 (0.0%) | 2 (1.8%) | 2 (1.8%) |
| | 15 – 49 years | Count (%) | 9 (8.1%) | 23 (20.7%) | 32 (28.8%) |
| | All age groups | Count (%) | 6 (5.4%) | 71 (64.0%) | 77 (69.4%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| Norethisterone enanthate injection | Below 15 years | Count (%) | 1 (0.9%) | 2 (1.8%) | 3 (2.7%) |
| | 15 – 49 years | Count (%) | 7 (6.3%) | 23 (20.7%) | 30 (27.0%) |
| | All age groups | Count (%) | 7 (6.3%) | 71 (64.0) | 78 (70.3%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| | Below 15 years | Count (%) | 0(0.0%) | 0(0.0%) | 0(0.0%) |

| Recording of reproductive health data element and RHIS training cross-tabulation | | | | | |
|---|---|---|---|---|---|
| | | | Attended 3-5 days RHIS training | | Total |
| | | | Yes | No | |
| Subdermal implant inserted | 15 – 49 years | Count (%) | 8 (7.2%) | 26 (23.4%) | 34 (30.6%) |
| | All age groups | Count (%) | 7 (6.3%) | 70 (63.1%) | 77 (69.4%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| IUD inserted | Below 15 years | Count (%) | 0(0.0%) | 0(0.0%) | 0(0.0%) |
| | 15 – 49 years | Count (%) | 6 (5.4%) | 29 (26.1) | 35 (31.5%) |
| | All age groups | Count (%) | 9 (8.1%) | 67 (60.4%) | 76 (68.5%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| Sterilisation performed | Below 15 years | Count (%) | 0(0.0%) | 0(0.0%) | 0(0.0%) |
| | 15 – 49 years | Count (%) | 3 (2.7%) | 22 (19.8%) | 25 (22.5%) |
| | All age groups | Count (%) | 12 (10.8%) | 74 (66.7%) | 86 (77.5%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| Male condom issued | Below 15 years | Count (%) | 0(0.0%) | 0(0.0%) | 0(0.0%) |
| | 15 – 49 years | Count (%) | 0(0.0%) | 11 (9.9%) | 11 (9.9%) |
| | All age groups | Count (%) | 15 (13.5%) | 85 (76.6%) | 100 (90.1%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |
| Female condom issued | Below 15 years | Count (%) | 0(0.0%) | 0(0.0%) | 0(0.0%) |
| | 15 – 49 years | Count (%) | 2 (1.8%) | 13 (11.7%) | 15 (13.5%) |
| | All age groups | Count (%) | 13 (11.7%) | 83 (74.8%) | 96 (86.5%) |
| Total | | Count (%) | 15 (13.5%) | 96 (86.5%) | 111 (100%) |

The results in Table 4.5 indicate that 13.5% (n=15) of respondents attended three- to five-days' RHIS training. Of those 15 who attended the training, eight (7.2%), nine (8.1%), seven (6.3%), eight (7.2%) and six (5.4%) understood the recording of the following reproductive health data elements: oral pill cycle issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively. Seven (6.3%), six (5.4%), eight (7.2%), seven (6.3%) and nine (8.1%) respondents did not understand the recording of the oral pill cycle being issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, despite attending the training. According to the NDoH (2016:108,109), the data elements indicated above are recorded when these services are offered to patients aged 15 to 49 years. On average, 50.4% of trained HCPs understood the recording of data elements mentioned above, while 49.6% did not understand the recording of these data elements.

Of the respondents who did not attend the training, 66 (59.5%), 71 (64%), 71 (64%), 70 (63.1%) and 67 (60.4%) recorded the oral pill cycle being issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, when the service is offered to women of all age groups. On average, 62.2% of respondents who did not attend the training did not understand the data elements indicated above. Moreover, 26 (23.4%), 23 (20.7%), 23 (20.7%), 26 (23.4%) and 29 (26.1%) of respondents who did not attend the training recorded on the oral pill cycle being issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, when the service is offered to women aged between 15 and 49 years. According to the NDoH (2016:108,109), the data elements indicated above are recorded when the services are offered to patients aged 15 to 49 years. The findings reflect that most respondents who did not attend the three- to five-days' RHIS training did not understand the recording of reproductive health data elements, as indicated above.

In terms of respondents' understanding of when to record sterilisations being performed, male condoms being issued and female condoms being issued, 12 (10.8%), 15 (13.5%) and 13 (11.7%) respondents who attended the three- to five-days' RHIS training indicated that the data elements are recorded when the service is offered to all age groups. Similarly, 74 (66.7%), 85 (76.6%) and 83 (74.8%) of respondents who did not attend the training indicated that these services are recorded when the service is offered to all age groups, respectively. According to the NDoH (2016:109, 110), the data elements indicated above are recorded on the RHIS when the service is offered to all age groups.

#### 4.2.2.4 Relationship between the recording of reproductive health data elements and attending training on reproductive health

Table 4.6 examines the relationship between respondents' understanding of the recording of reproductive health data elements and attending training on reproductive health.

**Table 4.6: Recording of the reproductive health data element and attending training on reproductive health: cross-tabulation**

| Recording of the reproductive health data element and attended training on reproductive health cross-tabulation | | | | | |
|---|---|---|---|---|---|
| | | | Attend training on reproductive health | | Total |
| | | | Yes | No | |
| Oral pill cycle | Below 15 years | Count (%) | 2 (1.8%) | 2 (1.8%) | 4 (.6%) |
| | 15 - 49 years | Count (%) | 16 (14.4%) | 18 (16.2%) | 34 (30.6%) |
| | All age groups | Count (%) | 33 (29.7%) | 40 (36.0%) | 73 (65.8%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Medroxyprogesterone injection | Below 15 years | Count (%) | 1 (0.9%) | 1 (0.9%) | 2 (1.8%) |
| | 15 - 49 years | Count (%) | 14 (12.6%) | 18 (16.2%) | 32 (28.8%) |
| | All age groups | Count (%) | 36 (32.4%) | 41 (36.9%) | 77 (69.4%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Norethisterone enanthate injection | Below 15 years | Count (%) | 1 (0.9%) | 2 (1.8%) | 3 (2.7%) |
| | 15 - 49 years | Count (%) | 14 (12.6%) | 16 (14.4%) | 30 (27.0%) |
| | All age groups | Count (%) | 36 (32.4%) | 42 (37.8%) | 78 (70.3%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Subdermal implant inserted | Below 15 years | Count (%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| | 15 - 49 years | Count (%) | 15 (13.5%) | 19 (17.1%) | 34 (30.6%) |
| | All age groups | Count (%) | 36 (32.4%) | 41 (36.9%) | 77 (69.4%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| IUD inserted | Below 15 years | Count (%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| | 15 - 49 years | Count (%) | 15 (13.5%) | 20 (18.0%) | 35 (31.5%) |
| | All age groups | Count (%) | 36 (32.4%) | 40 (36.0%) | 76 (68.5%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Sterilisation performed | Below 15 years | Count (%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| | 15 - 49 years | Count (%) | 9 (8.1%) | 16 (14.4%) | 25 (22.5%) |
| | All age groups | Count (%) | 42 (37.8%) | 44 (39.6%) | 86 (77.5%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Male condom issued | Below 15 years | Count (%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| | 15 - 49 years | Count (%) | 3 (2.7%) | 8 7.2%) | 11 (9.9%) |
| | All age groups | Count (%) | 48 (43.2%) | 52 (46.8%) | 100 (90.1%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |
| Female condom issued | Below 15 years | Count (%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| | 15 - 49 years | Count (%) | 5 (4.5%) | 10 (9.0%) | 15 (13.5%) |
| | All age groups | Count (%) | 46 (41.4%) | 50 (45.0%) | 96 (86.5%) |
| Total | | Count (%) | 51 (45.9%) | 60 (54.1%) | 111 (100.0%) |

The results from Table 4.6 reveal that, of the 51 (45.9%) respondents who attended the five days' reproductive health training, 16 (14.4%), 14 (12.6%), 14 (12.6%), 15

(13.5%) and 15 (13.5%) indicated that they recorded the oral pill cycle being issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, when the service is offered to women aged between 15 and 49 years old.

Thirty-three (29.7%) respondents recorded the oral pill cycle being issued when the service is offered to women of all age groups; and 36 (32.4%) recorded the Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted when the service is offered to women of all age groups, despite attending the training. According to the NDoH (2016:108,109), these data elements are only recorded when the services are offered to patients aged 15 to 49 years.

Of the 60 (54.1%) respondents who did not attend the five days' reproductive health training, 18 (16.2%), 18 (16.2%), 16 (14.4%), 19 (17.1%) and 20 (18%) indicated that they recorded the oral pill cycle issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, when the service is offered to women aged between 15 and 49 years. Forty (36%), 41 (36.9%), 42 (37.8%), 41 (36.9%) and 40 (36%) recorded the oral pill cycle issued, Medroxyprogesterone injection administered, Norethisterone enanthate injection administered, subdermal implant inserted, and IUCD inserted, respectively, when the service is offered to women of all age groups. Therefore, more respondents understood the recording of data elements among those who were not trained compared to the group was trained.

Regarding respondents' understanding of sterilisations performed, male condoms issued and female condoms issued, 42 (37.8%), 48 (43.2%) and 46 (41.4%) who attended the five days' training on reproductive health recorded the elements when the service is offered to women of all ages, respectively. Of the 60 (54.1%) respondents who did not attend the five days' training on reproductive health, 44 (39.6%), 52 (46.8%) and 50 (45.0%) recorded the elements when the service is offered to women of all age, respectively. The findings reveal that more HCPs understand the recording of the data elements among the group that was not trained compared to the trained group.

#### 4.2.2.5 Health care providers' understanding of reporting requirements

Respondents were asked to indicate the periodic cycle when the reproductive health data are sent to the district office, and to select the date on which the data are sent.

**Table 4.7: Health care providers' understanding of facility reporting requirements**

| | | Count | Column N % |
|---|---|---|---|
| Periodic cycle the facility sends reproductive health data to the district office | Weekly | 6 | 5.4% |
| | Monthly | 102 | 91.9% |
| | Quarterly | 3 | 2.7% |
| | Bi-annually | 0 | 0.0% |
| Date of the month the data is sent to the district office | on the 26th | 23 | 20.7% |
| | on the 3rd | 44 | 39.6% |
| | on the 7th | 43 | 38.7% |
| | on the 15th | 1 | 0.9% |

The results presented in Table 4.7 show that the majority (92%; n=102) of respondents indicated that the facility's reproductive health data are sent to the district office monthly, while 5.4% (n=6) and 2.7% (n=3) indicated that data are sent to the district office weekly and quarterly, respectively. According to the NDoH (2012a:8), data should be sent to either the sub-district or district level every month, thus some of the respondents did not know how often the data should be sent to the next reporting level.

Regarding the date on which data are sent, 39.6% (n=44) and 38.7% (n=43) indicated that the data are sent to the district office on the third and the seventh of every month, respectively, while 20.7% (n=23) and 0.9% (n=1) indicated that data are sent to the district office on the 26$^{th}$ and the 15$^{th}$, respectively. In Tshwane district, data are sent to the sub-district on the third of every month and the district on the seventh of every month (City of Tshwane [Sa]).

### 4.2.3 Section C: Health care providers' perceived confidence in performing reproductive health information management (HIM) tasks

An assessment of respondents' confidence level was used to determine how comfortable and confident respondents were in performing reproductive data management tasks, as indicated in Table 4.8. A scale of zero to 10 was used with zero reflecting no confidence and 10 reflecting utmost confidence.

**Table 4.8: Health care providers' perceived confidence in performing reproductive health information management (HIM) tasks**

| Descriptive Statistics | | | | | | |
|---|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | | Std. Deviation |
| | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic |
| I can collect reproductive health data correctly | 111 | 1 | 10 | **7.97** | .171 | 1.806 |
| I can check reproductive health data accuracy | 111 | 0 | 10 | **7.59** | .207 | 2.180 |
| I can calculate CYPR correctly | 111 | 0 | 10 | **3.06** | .283 | 2.977 |
| I can plot data by months or years | 111 | 0 | 10 | **4.22** | .319 | 3.361 |
| I can compute trend from bar charts | 111 | 0 | 10 | **3.46** | .298 | 3.136 |
| I can explain findings and their implications | 111 | 0 | 10 | **5.27** | .287 | 3.027 |
| I can use data for identifying gaps and setting targets | 111 | 0 | 10 | **5.77** | .277 | 2.914 |
| I can use data for making various types of decisions and providing feedback | 111 | 0 | 10 | **6.05** | .279 | 2.944 |

Table 4.8 gives a summary of respondents' confidence level in performing reproductive HIM-related tasks. The computed arithmetic mean statistics were used as standard self-reported ratings of HCPs' perceived confidence in performing reproductive HIM tasks. In approximate terms, the highest ratings' ranging was observed for items where respondents indicated that they could collect reproductive data correctly (mean = 7.97), check reproductive health data accuracy (mean = 7.59), and make use of data for various types of decisions and provide feedback (mean =

6.05). The moderate ratings were found in items where respondents indicated that they could use data to identify gaps and set targets (mean = 5.77), and explain findings and their implications (mean = 5.27). The lowest ratings were found in areas where respondents indicated that they could plot data by months or years (mean = 4.22), calculate the CYPR correctly (mean = 3.06), and computing trends from bar charts (mean = 3.46).

#### 4.2.3.1 Exploratory factor analysis: Health care providers' perceived confidence in performing reproductive health information management (HIM) tasks

**Table 4.9: Health care providers' perceived confidence in performing reproductive health information management (HIM) tasks**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Factor | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 3.574 | 59.561 | 59.561 | 3.290 | 54.828 | 54.828 | 2.388 | 39.805 | 39.805 |
| 2 | 1.195 | 19.920 | 79.482 | 1.042 | 17.363 | 72.191 | 1.943 | 32.386 | 72.191 |
| 3 | .540 | 9.008 | 88.489 | | | | | | |
| 4 | .404 | 6.728 | 95.217 | | | | | | |
| 5 | .187 | 3.114 | 98.332 | | | | | | |
| 6 | .100 | 1.668 | 100.000 | | | | | | |
| Extraction Method: Alpha Factoring. | | | | | | | | | |

Table 4.9 illustrates the results from the final iteration to reveal the presence of two initial eigenvalues greater than 1; hence, two factors were extracted from the selected items in the dataset for the dimension measuring "healthcare providers' perceived confidence in performing reproductive HIM tasks". As revealed by the **rotated sums of squared loadings**, approximately 72.1% of the total variance in the entire dataset for the respective constructs was accounted for by two factors. From the approximate 72.1% variance, factor 1 accounted for 39.8%, while factor 2 accounted for the remaining 32.3% variance in the retained dataset.

As a measure to aid the interpretation of the factor analysis, the Varimax rotation transformation method revealed factors that correlated when assessing HCPs'

perceived confidence in performing reproductive HIM tasks. The minimum factor loading cut off point of this study was 0.5. Consequently, all the items that failed to meet the factor loading of 0.5 and above were eliminated. Based on the Varimax rotation transformation method, two items were eliminated because they failed to meet the minimum factor loading of 0.5. The items were “I can use data for identifying gaps and setting targets” and “I can use data for making various types of decisions and providing feedback”. Two factors were specified, and an inspection of the item loadings on each factor was conducted; these results are presented in Table 4.10.

**Table 4.10: Health care providers’ perceived confidence in performing reproductive health information management (HIM) tasks**

| Rotated Factor Matrix[a] | | |
|---|---|---|
| | Factor | |
| | 1<br>Data analysis and interpretation | 2<br>Data accuracy |
| C18.Collect data correctly | .234 | .889 |
| C19.Check data accuracy | .250 | .947 |
| C20.Calculate CYPR correctly | .625 | .186 |
| C21.Plot data | .875 | .245 |
| C22.Compute trends | .850 | .131 |
| C23.Explain findings | .626 | .382 |
| Extraction Method: Alpha Factoring.<br>Rotation Method: Varimax with Kaiser Normalisation. | | |
| a. Rotation converged in 3 iterations. | | |

Two items, namely “collect data correctly” and “check data accuracy” were confirmed as loading onto a single factor (factor 2), with factor loadings of 0.89 and 0.947, respectively. Factor 2 is named “Data accuracy” because the two items were elements of accurate data collection. Concerning factor 1, four items were confirmed as loading to a single factor, with factor loadings ranging from 0.62 and 0.87 and a mean of 0.744. The ability to calculate CYPR correctly, plot data, compute trends and explain findings had loadings of 0.625, 0.875, 0.850 and 0.626 with factor 1, respectively. Therefore, factor 1 is called “data analysis and interpretation” because the four items were elements of data analysis and interpretation tasks.

### 4.2.4 Section D: Health care providers' views regarding organisational factors that influence data management tasks

This sectioned explored the respondents' views regarding organisational factors that influence data management tasks. It included practices regarding the use of reproductive health information, HCPs' views on the availability of resources, and HCPs' views regarding support and supervision.

#### 4.2.4.1 Practices regarding the use of reproductive health information

A five-point Likert scale was used to assess practices in the use of reproductive health information within the facility. Respondents feedback is reflected in Table 4.11.

**Table 4.11: Practices regarding the use of reproductive health information**

| | | Count | Column N % |
|---|---|---|---|
| Staff receive reproductive health service performance feedback on a monthly basis | Strongly disagree | 13 | 12% |
| | Disagree | 40 | 36% |
| | Neither disagree nor agree | 17 | 15% |
| | Agree | 35 | 32% |
| | Strongly agree | 6 | 5% |
| Staff receive reproductive health service performance feedback on a quarterly basis | Strongly disagree | 12 | 11% |
| | Disagree | 20 | 18% |
| | Neither disagree nor agree | 16 | 14% |
| | Agree | 52 | 47% |
| | Strongly agree | 11 | 10% |
| Feedback is always supported by evidence from the collected data | Strongly disagree | 6 | 5% |
| | Disagree | 35 | 32% |
| | Neither disagree nor agree | 19 | 17% |
| | Agree | 39 | 35% |
| | Strongly agree | 12 | 11% |
| Staff is allowed to make decisions based on the feedback received | Strongly disagree | 8 | 7% |
| | Disagree | 30 | 27% |
| | Neither disagree nor agree | 24 | 22% |
| | Agree | 36 | 32% |
| | Strongly agree | 13 | 12% |
| Data is gathered from the staff to find the root causes of the problem | Strongly disagree | 8 | 7% |
| | Disagree | 33 | 30% |
| | Neither disagree nor agree | 14 | 13% |
| | Agree | 51 | 46% |

| | | Count | Column N % |
|---|---|---|---|
| | Strongly agree | 5 | 5% |
| Staff is involved in selecting interventions for a given problem | Strongly disagree | 8 | 7% |
| | Disagree | 37 | 33% |
| | Neither disagree nor agree | 26 | 23% |
| | Agree | 33 | 30% |
| | Strongly agree | 7 | 6% |
| Staff is involved in evaluating the achievements of targets | Strongly disagree | 9 | 8% |
| | Disagree | 36 | 32% |
| | Neither disagree nor agree | 23 | 21% |
| | Agree | 35 | 32% |
| | Strongly agree | 8 | 7% |

Table 4.11 gives a summary of HCPs' views regarding the of the use of reproductive health information. Thirty-six per cent (n=40) of respondents disagreed, and 12% (n=13) strongly disagreed that staff receive reproductive health service performance feedback on a monthly basis. In contrast, 32% (n=35) agreed and 5% (n=6) strongly agreed. The majority (47%; n=52) of respondents agreed that staff receive reproductive health service performance feedback every quarter, while 18% (n=20) disagreed.

Thirty-five per cent (n=39) agreed that feedback is always supported by evidence from the collected data, while 32% (n=35) disagreed. Even though 32% (n=36) of respondents agreed that staff is allowed to make decisions based on the feedback received, 27% (n=30) disagreed. The majority (46%; n=51) of respondents agreed that data are gathered from the staff to find the root causes of problems, yet 30% (n=33) disagreed. Regarding staff members' involvement in selecting interventions for a given problem, 30% (n=33) agreed, and 33% (n=37) disagreed that staff members are consulted on problems. Lastly, an equivalent number (32%; n=35 and 32%; n=36) of respondents agreed and disagreed that staff is involved in evaluating the achievement of reproductive health targets.

### 4.2.4.2 Health care providers' views regarding the availability of resources

A five-point Likert scale was utilised to assess organisational commitment to ensuring data quality and use of information. The respondents were asked to indicate their views regarding the availability of resources, as indicated in Table 4.12.

**Table 4.12: Health care providers' views regarding the availability of resources**

| | | Count | Column N % |
|---|---|---|---|
| DHMIS SOP | Strongly disagree | 6 | 5.4% |
| | Disagree | 12 | 10.8% |
| | Neither disagree nor agree | 22 | 19.8% |
| | Agree | 62 | 55.9% |
| | Strongly agree | 9 | 8.1% |
| DHMIS Policy | Strongly disagree | 4 | 3.6% |
| | Disagree | 15 | 13.5% |
| | Neither disagree nor agree | 25 | 22.5% |
| | Agree | 58 | 52.3% |
| | Strongly agree | 9 | 8.1% |
| The latest Tshwane district health plan for reproductive health plan and targets | Strongly disagree | 4 | 3.6% |
| | Disagree | 32 | 28.8% |
| | Neither disagree nor agree | 44 | 39.6% |
| | Agree | 26 | 23.4% |
| | Strongly agree | 5 | 4.5% |
| The latest district health barometer to assess district reproductive health performance | Strongly disagree | 17 | 15.3% |
| | Disagree | 32 | 28.8% |
| | Neither disagree nor agree | 42 | 37.8% |
| | Agree | 17 | 15.3% |
| | Strongly agree | 3 | 2.7% |
| The latest facility operational plan indicating facility reproductive health plans and targets | Strongly disagree | 6 | 5.4% |
| | Disagree | 6 | 5.4% |
| | Neither disagree nor agree | 30 | 27.0% |
| | Agree | 60 | 54.1% |
| | Strongly agree | 9 | 8.1% |
| Latest NIDS definitions for the current data elements and indicator definitions | Strongly disagree | 5 | 4.5% |
| | Disagree | 6 | 5.4% |
| | Neither disagree nor agree | 28 | 25.2% |
| | Agree | 61 | 55.0% |
| | Strongly agree | 11 | 9.9% |
| HCPs are sufficient for data collection | Strongly disagree | 9 | 8.1% |
| | Disagree | 33 | 29.7% |
| | Neither disagree nor agree | 39 | 35.1% |

| | | Count | Column N % |
|---|---|---|---|
| | Agree | 21 | 18.9% |
| | Strongly agree | 9 | 8.1% |
| Data capturers are adequate for data capturing | Strongly disagree | 8 | 7.2% |
| | Disagree | 26 | 23.4% |
| | Neither disagree nor agree | 41 | 36.9% |
| | Agree | 24 | 21.6% |
| | Strongly agree | 12 | 10.8% |
| Computers are sufficient for capturing data | Strongly disagree | 9 | 8.1% |
| | Disagree | 19 | 17.1% |
| | Neither disagree nor agree | 40 | 36.0% |
| | Agree | 34 | 30.6% |
| | Strongly agree | 9 | 8.1% |
| The MDS tool is always available for data collection | Strongly disagree | 1 | 0.9% |
| | Disagree | 3 | 2.7% |
| | Neither disagree nor agree | 14 | 12.6% |
| | Agree | 65 | 58.6% |
| | Strongly agree | 28 | 25.2% |

Table 4.12 presents detailed findings on HCPs' experiences regarding the availability of HIMS resources. The majority (55.9%; n=62) of respondents agreed that the DHMIS SOP is always available when needed for reference, while 10.8% (n=12) disagreed and 19.8% (n=22) were not sure whether the SOP is always available. Correspondingly, the majority (52.3%; n=58) of respondents agreed that the DHMIS policy is always available when needed for reference, while 13.5% (n=15) disagreed, and 22.5% (n=25) were not sure whether the policy is always available.

Regarding the availability of the latest Tshwane district health plan and district health barometer, 23.4% (n=26) and 15.3% (n=17) agreed respectively, while 28.8% (n=32) disagreed on both aspects. Larger proportions (39.6%; n=44) of respondents neither disagreed nor agreed on the availability of district health plan. Similarly, 37.8% (n=42) of respondents neither disagreed nor agreed on the availability of district health barometer.

A majority of 54.1% (n=60) and 55% (n=61) of respondents agreed that the latest operational plan with reproductive health plans and targets, and the latest NIDS definitions are always available, respectively. While 27% (n=30) and 25.2% (n=28)

neither disagreed nor agreed concerning the availability of the latest facility operational plan and latest NIDS definitions, respectively.

The availability of human and material resources required for data collection and capturing was also assessed. Of the respondents, 29.7% (n=33), 18.9% (n=21) and 35.1% (n= 39) disagreed, agreed and neither disagreed nor agreed that HCPs are sufficient for data collection, respectively. In terms of the adequacy of data capturers, 23.4% (n=26) disagreed, 36.9% (n=41) neither disagreed nor agreed, while 21.6% (n=24) agreed that data capturers adequately captured data. The sufficiency of computers for data capturing was also assessed, and 30.6% (n=34) of respondents agreed that computers were sufficient, 36% (n=40) neither disagreed nor agreed, and 17.1% (n=19) disagreed. The larger proportion (58.6%; n=65) of respondents agreed that the MDS data collection tool is always available, 25.2% (n=28) strongly agreed, 12.6% (n=14) neither disagreed nor agreed, while a smaller proportion (2.7%; n=3) disagreed. The majority (83.8%) of respondents in this study indicated that the data collection tool is always available.

These findings reveal that more than 60% of respondents were aware of the availability of the DHMIS policy, SOP, operational plan, NIDS and MDS data collection tools.

#### 4.2.4.3 Health care providers' views regarding support and supervision from health information officers

A five-point Likert scale was employed to assess organisational commitment to ensuring data quality and use of information. The respondents were asked to indicate their views regarding support and supervision activities, as reflected in Table 4.13.

**Table 4.13: Health care providers' views regarding support and supervision from Health Information Officers**

| | | Count | Column N % |
|---|---|---|---|
| HIM officers conduct supervisory facility visits activities at least once per quarter | Strongly disagree | 10 | 9.0% |
| | Disagree | 24 | 21.6% |
| | Neither disagree nor agree | 38 | 34.2% |
| | Agree | 35 | 31.5% |
| | Strongly agree | 4 | 3.6% |
| HIM officer checks reproductive health data quality during the visit | Strongly disagree | 8 | 7.2% |
| | Disagree | 29 | 26.1% |
| | Neither disagree nor agree | 42 | 37.8% |
| | Agree | 28 | 25.2% |
| | Strongly agree | 4 | 3.6% |
| HIM officer discusses the performance of the reproductive health programme based on RHIS data during the visit to the facility | Strongly disagree | 8 | 7.2% |
| | Disagree | 32 | 28.8% |
| | Neither disagree nor agree | 44 | 39.6% |
| | Agree | 25 | 22.5% |
| | Strongly agree | 2 | 1.8% |
| HIM officer gives you an opportunity to discuss your health information challenges during the visit | Strongly disagree | 9 | 8.1% |
| | Disagree | 39 | 35.1% |
| | Neither disagree nor agree | 39 | 35.1% |
| | Agree | 22 | 19.8% |
| | Strongly agree | 2 | 1.8% |
| HIM officer conducts on-the-spot teaching/training when necessary during the visit | Strongly disagree | 11 | 9.9% |
| | Disagree | 40 | 36.0% |
| | Neither disagree nor agree | 39 | 35.1% |
| | Agree | 20 | 18.0% |
| | Strongly agree | 1 | 0.9% |
| HIM officer sends report or feedback on the last supervisory visit | Strongly disagree | 10 | 9.0% |
| | Disagree | 33 | 29.7% |
| | Neither disagree nor agree | 47 | 42.3% |
| | Agree | 19 | 17.1% |
| | Strongly agree | 2 | 1.8% |

Of the respondents, 21.6% (n=24), 34.2% (n=38) and 31.5% (n=35) disagreed, neither disagreed nor agreed and agreed, respectively, that HIM officers conduct supervisory facility visits at least once per quarter. Regarding HIM officers' checking of reproductive health data quality during the visits, 26.1% (n=29) disagreed, 37.8% (n=42) neither disagreed nor agreed, while 25.2% (n=28) agreed. Respondents were asked whether the HIM officers discuss reproductive health programmes' performance

based on the RHIS data during facility visits; 28.8% (n=32) disagreed, 39.6% (n=44) neither disagreed nor agreed, and 22.5% (n=25) agreed.

An equal proportion (35.1%, n=39) of respondents disagreed and neither disagreed nor agreed that HIM officers give them an opportunity to discuss health information challenges during the visit, while 19.8% (n=22) agreed. Concerning HIM officers conducting on-the-spot training when necessary during the visit, 36.0% (n=40) disagreed, 35.1% (n=39) neither disagreed nor agreed, and 18% (n=20) agreed. When asked whether HIM officers send reports or feedback on the last supervisory visit, 29.7% (n=33) disagreed, 42.3% (n=47) neither disagreed nor agreed, and 17.1% (n=19) agreed that the HIM officer sends the report or feedback.

#### 4.2.4.4 Health care providers' views regarding organisational factors that influence data management tasks

**Table 4.14: Health care providers' views regarding organisational factors that influence data management tasks**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Factor | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 7.486 | 35.649 | 35.649 | 7.138 | 33.989 | 33.989 | 4.552 | 21.676 | 21.676 |
| 2 | 3.618 | 17.228 | 52.877 | 3.373 | 16.060 | 50.048 | 3.574 | 17.019 | 38.695 |
| 3 | 1.990 | 9.475 | 62.353 | 1.684 | 8.019 | 58.068 | 2.210 | 10.524 | 49.219 |
| 4 | 1.526 | 7.267 | 69.620 | 1.230 | 5.857 | 63.924 | 2.061 | 9.815 | 59.034 |
| 5 | 1.100 | 5.239 | 74.859 | .780 | 3.712 | 67.637 | 1.807 | 8.603 | 67.637 |
| 6 | .829 | 3.948 | 78.807 | | | | | | |
| 7 | .750 | 3.572 | 82.379 | | | | | | |
| 8 | .639 | 3.041 | 85.420 | | | | | | |
| 9 | .546 | 2.600 | 88.020 | | | | | | |
| 10 | .397 | 1.889 | 89.909 | | | | | | |
| 11 | .375 | 1.784 | 91.693 | | | | | | |
| 12 | .355 | 1.689 | 93.382 | | | | | | |
| 13 | .277 | 1.319 | 94.700 | | | | | | |
| 14 | .243 | 1.155 | 95.856 | | | | | | |

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Factor | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 15 | .206 | .980 | 96.836 | | | | | | |
| 16 | .183 | .873 | 97.709 | | | | | | |
| 17 | .147 | .700 | 98.409 | | | | | | |
| 18 | .102 | .485 | 98.894 | | | | | | |
| 19 | .088 | .418 | 99.312 | | | | | | |
| 20 | .082 | .393 | 99.705 | | | | | | |
| 21 | .062 | .295 | 100.000 | | | | | | |
| Extraction Method: Alpha Factoring. | | | | | | | | | |

Computed results from the final iteration presented in Table 4.14 illustrate the presence of five initial eigenvalues greater than 1; hence, five factors were extracted from items in the dataset for the dimension assessing "HCPs' views regarding organisational factors influencing data management tasks". The **rotated sums of squared loadings**, approximately 67.6% of the total variance in the entire dataset, was accounted for by five factors extracted from the analysis. From the approximate total 67.6% variance, factor 1 accounted for 21.6%, factor 2 accounted for 17.0%, factor 3 accounted for 10.5%, factor 4 accounted for 9.8%, while factor 5 accounted for the remaining 8.6% variance in the retained dataset. According to Polit and Beck (2017:342), factors should be extracted when each factor's eigenvalue is greater than one. Extracted factors should account for at least 60% of the total variance, and each factor should contribute 5% or more to the total variance.

Correspondingly, the Varimax rotation transformation method revealed factors that were correlated when assessing the HCPs' views regarding organisational factors that influence data management tasks. Two items were thus eliminated because they did not meet the minimum factor loading of 0.5 set for this study. The items are named "The latest district health barometer to assess district reproductive health performance" and "MDS tool is always available for data collection". Five factors were extracted and named in accordance with the construct explained the items as reflected in Table 4.15.

**Table 4.15: Health care providers' views regarding organisational factors influencing data management tasks**

| Rotated Factor Matrix[a] | | | | | |
|---|---|---|---|---|---|
| | Factor | | | | |
| | 1 supervisory support visits | 2 Involvement of staff in decision-making | 3 DHMIS performance monitoring | 4 DHMIS resources | 5 DHMIS support documents |
| Staff receive reproductive health service performance feedback on a monthly basis | .216 | .543 | .437 | .064 | -.012 |
| Staff receive reproductive health service performance feedback on a quarterly basis | .155 | .474 | .736 | .061 | -.008 |
| Feedback is always supported by evidence from the collected data | .121 | .706 | .146 | .051 | .196 |
| Staff is allowed to make decisions based on the feedback received | .142 | .660 | .376 | .200 | .191 |
| Data is gathered from the staff to find the root causes of the problem | .119 | .738 | .094 | .195 | .161 |
| Staff is involved in selecting interventions for a given problem | .121 | .823 | .157 | .099 | .222 |
| Staff is involved in evaluating the achievements of targets | .153 | .858 | .105 | .075 | .161 |
| DHMIS SOPs | .049 | .176 | .281 | .151 | .804 |
| DHMIS Policy | .124 | .324 | .173 | .110 | .812 |
| The latest Tshwane district health plan for reproductive health plan and targets | .125 | .294 | .066 | .421 | .596 |
| The latest facility operational plan indicating facility reproductive health plans and targets | .031 | .203 | .783 | .079 | .354 |
| Latest NIDS definitions for the current data elements and indicator definitions | .128 | .146 | .729 | .135 | .273 |
| HCPs are sufficient for data collection | .202 | .218 | .010 | .660 | .187 |
| Data capturers are adequate for data capturing | .041 | .050 | .065 | .904 | .001 |
| Computers are sufficient for capturing data | .048 | .051 | .131 | .678 | .176 |
| HIM officers conduct supervisory facility visits activities at least once per quarter | .719 | .097 | .148 | .062 | .035 |

| Rotated Factor Matrix[a] | | | | | |
|---|---|---|---|---|---|
| | Factor | | | | |
| | 1 supervisory support visits | 2 Involvement of staff in decision-making | 3 DHMIS performance monitoring | 4 DHMIS resources | 5 DHMIS support documents |
| HIM officer check reproductive health data quality during the visit | .880 | .094 | .157 | .086 | .033 |
| HIM officer discusses the performance of the reproductive health program based on RHIS data during the visit to the facility | .877 | .181 | .114 | .029 | .022 |
| HIM officer gives you an opportunity to discuss your health information challenges during the visit | .892 | .140 | .056 | .071 | .066 |
| HIM officer conduct on-the-spot teaching/training when necessary during the visit | .812 | .121 | -.068 | .040 | .034 |
| HIM officer send report or feedback on the last supervisory visit | .857 | .118 | .005 | .118 | .067 |
| Extraction Method: Alpha Factoring. Rotation Method: Varimax with Kaiser Normalisation. | | | | | |
| a. Rotation converged in 6 iterations. | | | | | |

The first factor was named “supervisory support visits”. The items in this factor were related to the health information manager’s activities during the supervisory support visits. The factor consists of six items with loadings ranging between 0.719 and 0.892 and a mean loading of 0.839. The items of the second factor were related to staff involvement in decision-making and problem-solving. Factor 2 was named “Involvement of staff in decision-making” and consists of six items with factor loadings ranging from 0.543 to 0.858 and a mean loading of 0.721.

The third factor was named “DHMIS performance monitoring” because it consists of items assessing the activity and availability of the DHMIS documents necessary in planning programme performance targets. The factor consists of three items with factor loadings ranging from 0.729 to 0.783 and a mean loading of 0.749.

Factor 4 was named “DHMIS resources”. The items under this factor were related to the availability of resources required for data collection and capture. The factor consists of three items with loadings ranging from 0.660 to 0.904, with a mean loading of 0.747. The fifth factor was titled “DHMIS support documents” because it consists of items assessing the availability of DHMIS documents necessary in supporting data management processes, and contained three items with factor loadings ranging from 0.596 to 0.804, and a mean loading of 0.737. The mean loading of all factors is above 0.6, which is considered good. The higher mean loadings reflect that the observed items are strongly related to the factors (Ganyaupfu 2018:n.p.).

### 4.2.5 Section E: Health care providers’ views regarding the usability of the minimum data set data collection tool

This section explored HCPs’ views regarding the usability of the MDS data collection tool, also known as the primary health care data collection tool. The tool was assessed for its efficiency in collecting reproductive health data.

#### 4.2.5.1 Health care providers’ views regarding the efficiency of the MDS tool

The respondents were asked to comment on the efficiency of the MDS tool in collecting reproductive health data.

**Table 4.16: Health care providers’ views regarding the efficiency of the MDS tool**

| | | Count | Column N % |
|---|---|---|---|
| The MDS tool is easy to use | Strongly disagree | 2 | 1.8% |
| | Disagree | 8 | 7.2% |
| | Neither disagree nor agree | 10 | 9.0% |
| | Agree | 66 | 59.5% |
| | Strongly agree | 25 | 22.5% |
| The MDS tool is unnecessarily complex | Strongly disagree | 9 | 8.1% |
| | Disagree | 59 | 53.2% |
| | Neither disagree nor agree | 26 | 23.4% |
| | Agree | 12 | 10.8% |
| | Strongly agree | 5 | 4.5% |
| | Strongly disagree | 13 | 11.7% |

| | | | |
|---|---|---|---|
| The MDS tool takes a long time to complete | Disagree | 61 | 55.0% |
| | Neither disagree nor agree | 13 | 11.7% |
| | Agree | 22 | 19.8% |
| | Strongly agree | 2 | 1.8% |
| The MDS tool is well integrated with the HCPs' workflow | Strongly disagree | 2 | 1.8% |
| | Disagree | 22 | 19.8% |
| | Neither disagree nor agree | 29 | 26.1% |
| | Agree | 45 | 40.5% |
| | Strongly agree | 13 | 11.7% |

As presented in Table 4.16, 22.5% (n=25), 59.5% (n=66) and 9% (n=10) strongly agreed, agreed, and neither disagreed nor agreed respectively that the MDS tool is easy to use. Less than 10% (7.2%; n=8 and 1.8%; n=2) disagreed that the tool is easy to use. Regarding the complexity of the tool, the majority (53%; n=59) of respondents disagreed, 23.4% (n=26) neither disagreed nor agreed, and 10.8% (n=12) agreed that the MDS tool is unnecessarily complex. Respondents were asked whether the MDS tool takes a long time to complete and 11.7% (n=13) strongly disagreed, 55% (n=61) disagreed, 11.7% (n=13) neither disagreed nor agreed; 19.8% (n=22) agreed. Of the respondents, 19.8% (n=22) disagreed with the view that the MDS tool is well integrated with the HCPs' workflow, while 26.1% (n=29) neither disagreed nor agreed, 40.5% (n=45) agreed, and 11.7% (n=13) strongly agreed. More than 60% of respondents found the MDS data collection tool as easy to use, not complex, and not taking too long to complete.

#### 4.2.5.2 Health care providers' views regarding the effectiveness of the MDS tool

The respondents were asked to comment on the effectiveness of the MDS tool in collecting reproductive health data.

**Table 4.17: Health care providers' views regarding the effectiveness of the MDS tool in collecting reproductive health data**

| | | Count | Column N % |
|---|---|---|---|
| The MDS tool has enough fields for recording reproductive health data | Strongly disagree | 4 | 3.6% |
| | Disagree | 19 | 17.1% |
| | Neither disagree nor agree | 12 | 10.8% |
| | Agree | 70 | 63.1% |

| | | Count | Column N % |
|---|---|---|---|
| | Strongly agree | 6 | 5.4% |
| It is easy to enter data on the wrong block/field on the MDS tool | Strongly disagree | 6 | 5.4% |
| | Disagree | 10 | 9.0% |
| | Neither disagree nor agree | 6 | 5.4% |
| | Agree | 72 | 64.9% |
| | Strongly agree | 17 | 15.3% |
| It is easy to aggregate data incorrectly on the MDS tool | Strongly disagree | 4 | 3.6% |
| | Disagree | 10 | 9.0% |
| | Neither disagree nor agree | 14 | 12.6% |
| | Agree | 69 | 62.2% |
| | Strongly agree | 14 | 12.6% |
| Data collected on the MDS always offer a true reflection of reproductive health activities | Strongly disagree | 9 | 8.1% |
| | Disagree | 25 | 22.5% |
| | Neither disagree nor agree | 31 | 27.9% |
| | Agree | 38 | 34.2% |
| | Strongly agree | 8 | 7.2% |

Table 4.17 presents detailed findings on the effectiveness of the MDS tool in collecting reproductive health data. The majority (63.1%; n=70) of respondents agreed that the MDS tool has enough fields for recording reproductive health data, while 10.8% (n=12) neither disagreed nor agreed, and 17.1% (n=19) disagreed. Regarding the easiness of entering the data in the wrong block/field on the MDS, the majority (64.9%; n=72) of respondents agreed, 15.3% (n=17) strongly agreed, and 9% (n=10) disagreed. Correspondingly, the majority (62.2%; n=69) of respondents agreed that it is easy to aggregate data incorrectly on the MDS tool, and 12.6% (n=14) strongly agreed, while 12.6% (n=14) neither disagreed nor agreed, and 9% (n=10) disagreed. The respondents were also asked whether data collected on the MDS always offer a true reflection of the reproductive health activities, and 22.5% (n=25) disagreed, 27.9% (n=31) neither disagreed nor agreed, and 34.2% (n=38) agreed. The findings in this study indicate that the MDS data collection tool seemed not user-friendly because 80.2% (n=89) and 74.8% (n=83) of respondents indicated that it is easy to enter data into the wrong field and aggregate incorrectly, respectively.

### 4.2.5.3 Exploratory Factor Analysis: Health care providers' views regarding the usability of the data collection tool

**Table 4.18: Health care providers' views regarding the usability of the data collection tool**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| Component | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 2.314 | 28.927 | 28.927 | 2.314 | 28.927 | 28.927 | 1.864 | 23.296 | 23.296 |
| 2 | 1.496 | 18.698 | 47.625 | 1.496 | 18.698 | 47.625 | 1.590 | 19.874 | 43.171 |
| 3 | 1.467 | 18.341 | 65.966 | 1.467 | 18.341 | 65.966 | 1.494 | 18.677 | 61.848 |
| 4 | 1.004 | 12.556 | 78.522 | 1.004 | 12.556 | 78.522 | 1.334 | 16.674 | 78.522 |
| 5 | .623 | 7.793 | 86.315 | | | | | | |
| 6 | .498 | 6.230 | 92.544 | | | | | | |
| 7 | .380 | 4.749 | 97.293 | | | | | | |
| 8 | .217 | 2.707 | 100.000 | | | | | | |
| Extraction Method: Alpha Factoring | | | | | | | | | |

Table 4.18 shows the presence of four initial eigenvalues greater than 1; hence, four factors were extracted from the questionnaire items in the dataset for the dimension assessing "HCPs' views regarding the usability of the data collection tool". Based on the **extracted initial eigenvalues**, about 78.5% of the total variance in the respective construct was accounted for by four factors. From the approximate total 78.5% variance, factor 1 accounted for 23.2%, factor 2 accounted for 19.8%, factor 3 accounted for 18.6%, and factor 4 accounted for 16.7%. As stated, the minimum factor loading cut off point of this study was 0.5; all items in this section thus met the minimum factor loading of 0.5 and were all retained. Based on the Varimax rotation transformation method, four factors were extracted and named in accordance with the construct explained in the items, as reflected in Table 4.19.

**Table 4.19: Health care providers' views regarding the usability of the data collection tool**

| Rotated Factor Matrix[a] | | | | |
|---|---|---|---|---|
| | Factor | | | |
| | 1<br>Not user-friendly | 2<br>Effective for data collection | 3<br>Time-consuming | 4<br>Efficient for data collection |
| It is easy to aggregate data incorrectly on the MDS tool | .937 | -.094 | .003 | .040 |
| It is easy to enter data on the wrong block/field on the MDS tool | .900 | -.063 | .063 | -.123 |
| The MDS tool has enough fields for recording reproductive health data | -.004 | .917 | -.026 | -.003 |
| Data collected on the MDS always offer a true reflection of reproductive health activities | -.159 | .837 | .000 | .241 |
| The MDS tool is unnecessarily complex | -.142 | -.025 | .834 | .110 |
| The MDS tool takes a long time to complete | .343 | .005 | .743 | -.193 |
| The MDS tool is well integrated with the HCPs' workflow | -.108 | .181 | .205 | .819 |
| The MDS tool is easy to use | .036 | .045 | -.447 | .734 |
| Extraction Method: Alpha Factoring. Rotation Method: Varimax with Kaiser Normalisation. | | | | |
| a. Rotation converged in 4 iterations. | | | | |

The first factor was named "not user-friendly". The items in this factor were related to the layout of the MDS tool, which makes it easy for the HCPs to make mistakes when entering and aggregating data. The factor consists of two items with loadings of 0.937 and 0.900, and a mean loading of 0.918. The second factor items were related to the sufficiency of the MDS tool in capturing reproductive data and offering a true reflection of reproductive health activities. Factor 2 was titled "effective for data collection" and consists of two items with factor loadings 0.917 and 0.837 and a mean loading of 0.877. The third factor was named "time-consuming". The items under this factor were related to the complexity, and the time taken to complete the MDS tool. The factor consists of two items with loading 0.834 and 0.743, with a mean loading of 0.788. Factor 4 was called "efficient for data collection" because it consists of items assessing the integration of the MDS tool with HCPs' workflow and the ease with which the tool is used. Factor 4 consists of two items with factor loadings of 0.819 and 0.734, and a mean loading of 0.776. The mean loading of all factors was above 0.6, which is

considered good. The higher mean loadings reflect that the observed items are strongly related to the factors (Ganyaupfu 2018:n.p.).

## 4.3 FINDINGS FROM DATA QUALITY ASSESSMENT

This section provides findings on data quality checks that were conducted. A structured close-ended checklist was used for observed evidence of data quality from monthly reports and management directives. Six months' of reproductive health data for the year 2017 were reviewed for availability, accuracy, completeness and timeliness.

### 4.3.1 Availability of standard operating procedure (SOP)

The availability of the DHMIS SOP was assessed, and the results are presented in the sections that follow.

**Table 4.20: Availability of SOP**

| | | Count | Column N % |
|---|---|---|---|
| DHMIS Standard Operating Procedure for facility level is available in the facility | Yes | 12 | 92.3% |
| | No | 1 | 7.7% |

Table 4.20 indicates that 12 (92.3%) out of 13 facilities had the DHMIS SOP available in the RHIS file.

### 4.3.2 Availability of monthly reports

Thirteen facilities were assessed on the availability of primary health care RHIS reports from June to November 2017.

**Table 4.21: Availability of monthly reports**

| | | Count | Column N % |
|---|---|---|---|
| June 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |
| July 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |

| | | | |
|---|---|---|---|
| August 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |
| September 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |
| October 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |
| November 2017 monthly report | Yes available | 13 | 100.0% |
| | No | 0 | 0.0% |

All facilities (100%) had an electronic copy of the RHIS monthly report sent to the district office.

### 4.3.3 Evidence of management directives

The facilities were assessed on the availability of directives from the HIM office at the sub-district or district level addressing data accuracy, completeness and timeliness. Directives should not have been older than three months when data were collected.

**Table 4.22: Evidence of management directives**

| Availability of directives | | Count | Column N % |
|---|---|---|---|
| Evidence of directives from management or district office in the last three months highlighting data accuracy challenges | Yes available | 11 | 84.6% |
| | No | 2 | 15.4% |
| Evidence of directives from management or district office in the last three months highlighting challenges of the incompleteness of monthly report | Yes available | 5 | 38.5% |
| | No | 8 | 61.5% |
| Evidence of directives from management or district office in the last three months highlighting challenges of timely submission of reports | Yes available | 8 | 61.5% |
| | No | 5 | 38.5% |

Table 4.22 shows that the largest proportion of 84.6% (n=11) of facilities had directives from management or the district office in the last three months highlighting data accuracy challenges, while 15.4% (n=2) did not. Evidence of directives from management or the district office in the last three months highlighting challenges in terms of the incompleteness of monthly reports were available in 38.5% (n=5) of facilities, and not available in 61.5% (n=8). Contrarily, equivalent proportions of 61.5% (n=8) of the facilities had evidence of directives from management or the district office

in the last three months highlighting challenges with timely submissions of reports, while 38.5% (n=5) did not. The majority (61.5%) of facilities in this study could not produce evidence of directives highlighting challenges in data completeness. However, they could produce evidence of directives highlighting data accuracy and timely submission of reports.

### 4.3.4 Data accuracy

Data accuracy was assessed by comparing data from the facility-generated monthly report with the data from the DHIS software-generated report at the district office. Reproductive health data elements, namely the oral pill cycle issued, Norethisterone enanthate injection administered, Medroxyprogesterone injection administered, IUCD inserted, and subdermal implant inserted were assessed in 13 facilities.

**Table 4.23: Cross-tabulation of Data element * Month * Accuracy outcome (Facility report versus DHIS)**

| Data Elements | Facility versus DHIS software | Months | | | | | |
|---|---|---|---|---|---|---|---|
| | | Jun-17 | Jul-17 | Aug-17 | Sep-17 | Oct-17 | Nov-17 |
| Oral pill cycle | Same | 12 (92%) | 12 (92%) | 12 (92%) | 5 (38%) | 11 (85%) | 13 (100%) |
| | Different | 1 (8%) | 1 (8%) | 1 (8%) | 8 (62%) | 2 (15%) | 0 (0%) |
| Norethisterone enanthate injection | Same | 13 (100%) | 13 (100%) | 13 (100%) | 4 (31%) | 12 (92%) | 13 (100%) |
| | Different | 0 (0%) | 0 (0%) | 0 (0%) | 9 (69%) | 1 (8%) | 0 (0%) |
| Medroxyprogesterone injection | Same | 12 (92%) | 13 (100%) | 13 (100%) | 4 (31%) | 12 (92%) | 13 (100%) |
| | Different | 1 (8%) | 0 (0%) | 0 (0%) | 9 (69%) | 1 (8%) | 0 (0%) |
| IUD inserted | Same | 13 (100%) | 13 (100%) | 13 (100%) | 13 (100%) | 11 (85%) | 13 (100%) |
| | Different | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (15%) | 0 (0%) |
| Subdermal implant inserted | Same | 13 (100%) | 13 (100%) | 13 (100%) | 8 (62%) | 12 (92%) | 13 (100%) |
| | Different | 0 (0%) | 0 (0%) | 0 (0%) | 5 (38%) | 1 (8%) | 0 (0%) |

Of the 13 facilities that were assessed, results presented in Table 4.23 show that performance data recorded for the Norethisterone enanthate injection, IUCD, and subdermal implant data elements were accurate in all (100%, n=13) facilities. The oral pill cycle and Medroxyprogesterone injection data were accurate in 92% (n=12) of facilities. During July and August 2017, there was only one facility (3%) with inaccurate data in June 2017 for the data element 'oral pill cycle', while the rest of the elements were accurate in all facilities. In September, the only accurate data in all facilities (100%, n=13) was on IUCDs inserted. The data for the oral pill cycle, Norethisterone enanthate injection, Medroxyprogesterone injection and the subdermal implant was accurate in 38% (n=5), 31% (n=4), 31% (n=5) and 62% (n=8) of facilities, respectively. For October 2017, data for oral pill cycle and IUCD were accurate in 85% (n=11) of facilities; and data for Norethisterone enanthate injection, Medroxyprogesterone injection and subdermal implant were accurate in 97% (n=12) of facilities. All five data elements were accurate in all facilities (100%, n=13) in November 2017.

The study's findings reveal that only 38%, 31%, and 31% of facilities had accurate data on oral pill cycles, Norethisterone enanthate and Medroxyprogesterone injection data elements in September 2017 respectively.

### 4.3.5 Data completeness

The monthly reports' data completeness at the facilities was assessed based on how many reproductive health data items from the monthly reports were supposed to be completed by the facility but were left blank without indicating "0" from June to November 2017.

**Table 4.24: Completeness of data elements**

| | | Frequency | Per cent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | No | 13 | 100.0 | 100.0 | 100.0 |

Table 4.24 reflects that none of the reproductive health data items from monthly reports that are supposed to be completed by the facility were left blank. Data completeness was 100% in all facilities.

### 4.3.6 Data timeliness

Data timeliness was assessed by observing evidence of dates on which the monthly reports were sent to either the sub-district or district HIM office. Evidence was observed in the form of emails containing monthly reports. There were nine facilities belonging to the municipality that were expected to send data to the sub-district by the third of every month, and four facilities belonging to the provincial management were expected to send data to the district by the seventh of every month. Timely data is thus data that is sent by the third and the seventh of every month by the municipality facility and provincial facility respectively.

**Table 4.25: Data timeliness**

| Reporting facility type | | Month | | | | | |
|---|---|---|---|---|---|---|---|
| | | June | July | August | September | October | November |
| Evidence of **municipality facility** reporting on its monthly performance to the sub-district office by the 3rd of every month | Yes | 4 (30.7%) | 3 (23%) | 2 (15.3%) | 8 (61.5%) | 7 (53.8%) | 2 (15.3%) |
| | No | 5 (38.4%) | 66 (46.1%) | 7 (53.8%) | 11 (7.6%) | 2 (15.3%) | 7(53.8%) |
| Evidence of **provincial facility** reporting on its monthly performance to the district office by the 7th of every month from June to Nov 2017 | Yes | 3 (23%) | 4 (30.7%) | 4 (30.7%) | 4 (30.7%) | 4 (30.7%) | 3 (23%) |
| | No | 1 (7.6%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (7.6%) |
| | Yes | 7 (53.8%) | 7 (53.8%) | 6 (46.1%) | 12 (92.3%) | 11 (84.6%) | 5 (38.4%) |
| | No | 6 (46.1%) | 6 (46.1%) | 7 (53.8%) | 1 (7.6%) | 2 (15.3%) | 8 (61.5%) |

Table 4.25 shows that 53.8% (n=7) of facilities reported on time to the sub-district or district for June and July 2017, while 46.1% (n=6) did not. In August, it was found that 46.1% (n=6) of facilities reported on time, while 53.8% (n=7) did not. Greater improvement was observed in September and October, where 92.3% (n=12) and 84.6% (n=11) of facilities reported on time, respectively. Only 7.6% (n=1) and 15.3% (n=2) of facilities did not report on time for September and October, respectively. Conversely, in November data timeliness dropped. A minority (38.4%; n=5) of facilities reported on time, while 61.5% (n=8) did not. On average, 61.5% of monthly reports in this study were sent on time.

## 4.4 SUMMARY

This chapter presented results obtained from the statistical analysis conducted to determine how the RHIS is used to generate relevant, reliable and accurate data to assess the quality of reproductive health data at the facilities. Statistical validity and scale reliability tests were first performed before the computation of factors analysis and descriptive statistics. Descriptive data were presented in tables and graphs.

Next, the qualitative findings are analysed and presented.

# CHAPTER 5
# ANALYSIS, PRESENTATION AND INTEGRATION OF QUALITATIVE FINDINGS WITH LITERATURE

## 5.1 INTRODUCTION

Chapter 4 of the study presented the results of the quantitative data. This chapter focuses on the presentation of the qualitative data obtained during the interviews conducted with health facility managers working at the health care facilities in Tshwane district, Region 3, Gauteng Province. Based on the methodology of the study, which is a sequential explanatory mixed-method approach, the collection and analysis of the qualitative data were done after the analysis of the quantitative data.

The purpose of the qualitative phase of the study was to explore managers' role in managing reproductive health information, assess the use of reproductive health information in decision-making, and identify barriers, challenges, and opportunities for effective data management. Literature relevant to the research findings was used as the control measure. The first section of the chapter presents the method used to analyse data, followed by research findings and the literature control, emerging relevant outliers, and a conclusion.

## 5.2 DATA ANALYSIS

In-depth interviews were conducted with 11 health facility managers from 11 different facilities. The objective of this phase guided the analysis, and a thematic analysis approach was followed. The step described by Nieuwenhuis (2017:114) were used, and involved the concurrent verbatim transcription of interviews during the data collection process. The data were then categorised into segments using both inductive and deductive reasoning, and examined for differences and similarities by grouping them into themes (Gray et al 2017:273; Brink et al 2018:180; Nieuwenhuis 2017:114).

## 5.3 RESEARCH FINDINGS AND LITERATURE CONTROL

### 5.3.1 Participants' biographic information

Table 5.1 provides the participants' biographic data, in terms of their gender, age, years of experience as a facility manager, and their highest qualifications.

**Table 5.1: Biographic details of the participants**

| No | Gender | Age | Year of experience in the position | Highest qualification |
|---|---|---|---|---|
| 1 | Female | 35 | 13 months | Degree in Nursing Science and Art |
| 2 | Female | 59 | 15 years | Master degree in Public Health |
| 3 | Female | 52 | 8 years | Degree in Nursing Management and Education |
| 4 | Female | 44 | 5 years | Degree in Nursing Management and Education |
| 5 | Female | 46 | 3 years | Advance diploma in health service management |
| 6 | Male | 45 | 4 years | Diploma in Nursing Science |
| 7 | Female | 44 | 3 years | Degree in Nursing Management and Education |
| 8 | Female | 57 | 23 years | B Honours in Nursing |
| 9 | Female | 41 | 3 months | Diploma in Nursing Science |
| 10 | Female | 53 | 14 years | Degree in Nursing Management |
| 11 | Female | 62 | 7 years | Honours degree in Community Nursing science |

Ten out of 11 participants were female. One participant was aged between 30 and 39 years, five were aged between 40 and 49 years, and four were aged between 50 and 59 years, while one was aged between 60 and 69 years. Eight participants had 0 to nine years' experience in the facility manager's position; two had 10 to 19 years' experience, while one had 20-29 years' experience. All participants were facility

managers with at least a diploma in nursing science. Of the 11 participants, nine were from the City of Tshwane Metropolitan Municipality facilities, and two were from the Tshwane District Provincial Government facilities.

## 5.4 THEMATIC PRESENTATION OF RESULTS AND LITERATURE CONTROL

According to Creswell and Poth (2018:328), themes are broad elements of information that consist of several codes grouped to form a common idea. Gray et al (2017:677) further describe themes as “ideas related to the phenomenon of interest that the researcher discovers during the process of data collection and analysis”. The researcher developed themes that were emergent from the analysis.

The following themes emerged:

**Theme 1:** Current practices in reproductive data management
**Theme 2:** The use of reproductive health information for decision-making
**Theme 3:** Views regarding the couple year protection rate indicator
**Theme 4**: Evaluation of the programme’s performance

### 5.4.1 Theme 1: Current practices in reproductive data management

Reproductive health information is vital in ensuring that the country achieves SDG3, namely, ensuring healthy lives and promoting wellbeing for all at all ages. The country’s performance and progress towards the SDG 3.7 target (ensuring universal access to sexual and reproductive health care services, including family planning, information and education, and the integration of reproductive health into national strategies and programmes) can only be monitored through an effective health information system (Osborn et al 2015:13; Warren, Hopkins, Narasimhan, Collins, Askew & Mayhew 2017:iv105).

In ‘Theme 1: Current practices in reproductive data management’, three sub-themes emerged: the role of the facility manager, views regarding the quality of data, and collaborations and supportive supervision. The sub-themes and categories of Theme 1 are presented in Table 5.2.

**Table 5.2: Current practices in reproductive data management**

| Theme | Subtheme | Category |
|---|---|---|
| **Theme 1 Current practices in reproductive data management** | 1.1 Role of the facility manager | 1.1.1 Data management<br>1.1.2 Capacity building in data management |
| | 1.2 Views regarding the quality of data | 1.2.1 Level of satisfaction with data quality<br>1.2.2 Impact of data quality on information use |
| | 1.3 Collaborations and supportive supervision | 1.3.1 Perceived support by health information officers<br>1.3.2 Areas for improvement |

#### 5.4.1.1 Subtheme 1.1: Role of the facility manager

In this subtheme, two categories, namely, data management and capacity building in data management, emerged.

##### 5.4.1.1.1 Category 1.1.1: Data management

Nutley and Michelle (2018:19) describe data management as a process that involves data collection, storage, data quality assurance, data processing, and the compilation of reports.

The majority of participants described their role in reproductive health information generation as data managers, also indicating their role in supporting data management. They further elaborated on their roles concerning tasks involved in data management, such as ensuring correct data collection and capturing, data processing, and the compilation of monthly reports on data elements related to the CYPR indicator.

Their role in ensuring data-driven decisions at various levels of governance was emphasised.

> *I regard myself as the data manager, obviously the data champion (P1)*

> *I am the data manager of this facility. I, therefore, monitor the daily stats, to see that it has been recorded, they have ticked and completed the MDS adequately and that is totalled and signed (P11)*

> *My role as a facility manager in Health Information Management is to provide data that will enable me, the Department, the District, and National as a whole to make decisions that will bring an impact onto the lives of the clients who are using our contraception services (P8)*

Consistent with the findings, Somi, Metee, Wengaa, Darcy and Perera (2017:83) found that in Tanzania, the person in charge of the facility was the one responsible for the data management of that facility. According to the NDoH (2012a:17), data management, monitoring and reporting are facility managers' roles and should be stipulated in their job description and performance management contracts. Data management involves organisational beliefs and ideas about collecting, processing, sharing and using information for decision-making (Mukred & Singh 2017:266).

As part of data management, facility managers are expected to support and ensure effective data collection, processing, and use of information (NDoH 2012a:17). A relatively moderate number of participants mentioned that they support data collection by ensuring that facilities have the necessary resources for data collection. They specifically acknowledged their jurisdiction over the data collection tool (MDS register).

> *We need to make sure that the MDS registers are available for data collection. (P5)*

> *This will ensure that clinicians' record data on services provided to patients. (P2)*

The NDoH (2012a:17) confirms that the manager's role is to provide sufficient resources required for effective data management. These resources include data collection forms, data input forms, and definitions of data elements.

In ensuring correct **data collection and collation**, a majority of participants indicated that it is their role to ensure that HCPs and data capturers know the importance of the HIMS. As facility managers, they also monitor data collection processes, and the weekly capturing of data onto the electronic record. The following statements relate to this finding:

> *Firstly, I have to make sure that staff know what a health information management system is, and daily, the data capturer captures the data into the system (P5)*

> *At the end of every week, I check if data from all consulting rooms are captured (P4)*

> *I ensure that clinicians record data on contraception services provided to patients and make sure that the captured data is transferred to an electronic report (P2)*

As part of **data processing** as a measure to ensure data accuracy, all participants indicated that they conduct data verification weekly. The verification process was described as the random selection of patients' clinic file numbers from the data collection register, also known as the MDS tool, and comparing the activities recorded on the patient's file with activities recorded on the MDS tool. They consider data accurate when data from the two records correspond.

> *We do data verification each time before submitting a single number to DHIS. Nurses and doctors need to make sure that whatever they are ticking should be accurate, for example, if they have inserted 10 IUCDs, we randomly select the specific files and double-check if the IUCDs were inserted for the specific patients mentioned. If they say they inserted eight and you can trace 7, you can be confident to say they are recording exactly what they do. (P1)*

*Let us say they ticked that they have inserted an implant; I will do verification to check if they have captured correctly by asking for the file of the patient and check if what they have ticked corresponds with what has been captured in the file. If they correspond, the data is accurate. (P4)*

*I take out the files to verify whether what they ticked correspond with whatever they did, more especially when it comes to contraceptive pills, if maybe the nurse has made a tick, we take out a file, and then we check whatever is written in the file. (P7)*

In contrast, studies found that operational managers did not verify data before sending it to the sub-district. Operational managers take the data at face value without looking at the source document, consequently submitting data with errors that could have been fixed in the facility (Jamin, Kaposhi, Schopflocher & Mqoqi 2014:5). Verification of source documents and input forms at the facility and sub-district level was thus necessary to promote the accountability and accuracy of health information (Jamin et al 2014:6).

The majority of participants indicated that after the data is verified and validated, it is then prepared into a **monthly report**. They expressed the need to ensure that the electronically captured data are accurate before compiling the monthly reports. The statements below indicate the sentiments expressed by the participants at most of the facilities:

*I usually validate data after I have captured them on the system, it becomes much easy then when you pick up any problem, I revert to the clinician's book and verify the data (P2)*

*At the end of the month, I compile the monthly summary report. I have to make sure that before I sign the report, I go through the data again, to ensure that they are accurate (P5)*

*From the monthly report, I check if all the information needed is captured. Because our tool it indicates if something is wrongly captured. If not correctly captured, I then go back and verify before finalising the report. (P6)*

Similarly, studies found that most facilities were compiling a monthly summary report and sending it to the district office every month (Abera et al 2016:103; Innocent et al 2016:10). Monthly reporting forms part of data transmission to designated points to ensure availability and is a precursor to information use (Cheburet & Odhiambo-Otieno 2016b:135; PEPFAR et al 2015:14).

#### 5.4.1.1.2 Category 1.1.2: Capacity building in data management

All participants believed that one of their mandates is to strengthen and build capacity among their staff members in terms of HIM. They elaborated on various strategies, such as introducing new staff members, performing on-the-spot training, and taking a scheduled team approach. They proclaimed that every effort is made to provide up-to-date, relevant and specific content on health information processes and reproductive health care. Most participants explained that emphasis was on the data elements, indicators, SOP, policy, data collection tool, data collection, analysis, use of data, and constant monitoring of the data being produced.

*We do everything in our capacity to ensure that people are trained on information management, produce accurate data, and also to be able to analyse data to see how we can improve the service, and also use the data for planning and evaluation of the services (P3)*

*When new community service nurses join the facility, we do induction on data management, with the emphasis on data elements, indicators, SOPs and the policy (P4)*

*When I do data verification and find errors. I usually approach the person and make him/her aware of the error. We are able to correct the error on-the-spot moving forward it improves (P1)*

Many participants indicated that staff members are subjected to team in-service training conducted in the facility by either the health information officer or a staff member.

> *We do in-service training in the facility. Every month, we conduct in-service training for different programmes. There is a day in the programme allocated for data management. (P9)*

> *We had an in-service session with DHIS (referring to the health information management team) whereby we were trying to outline all the indicators and their meaning so that the health practitioners clearly understand them. For example, the oral pills issued to a client. We record the number of packets issued. (P6)*

In support of the findings, the NDoH (2012a:17) assent that facility managers should ensure that staff members are trained on data elements, the assessment of data quality, and the use of information. In their study assessing organisational factors affecting data quality, Cheburet and Odhiambo-Otieno (2016a:204) found that most HCPs in Kenya were not orientated on HIM documents, including the SOP and data quality protocol. Meanwhile, only 33% of HCPs in Kenya were in-serviced by their colleagues on HIM and data collection (Cheburet & Odhiambo-Otieno 2016b:133). Studies have found that providing in-service training and mentoring newly appointed graduates without training or experience in data management helped ensure that the health information system has proficient human resources (Kiwanuka, Kimaro & Senyoni 2015:3).

#### 5.4.1.2 Subtheme 1.2: Views regarding the quality of data

Data quality is defined as data with characteristics required to satisfy the needs for the intended use (Mpofu, Semo, Grignon, Lebelonyane, Ludick, Matshediso et al 2014:2). Ledikwe, Grignon, Lebelonyane, Ludick, Matshediso, Sento et al (2014:02) describe data quality as a complex concept, which involves multiple dimensions, including accuracy, completeness, timeliness, integrity, confidentiality, and reliability. Two

categories emerged from the data, namely level of satisfaction with data quality, and the impact of data quality on information use.

#### 5.4.1.2.1 Category 1.2.1: Level of satisfaction with data quality

The majority of participants generally considered the reproductive health data as being of good quality, with some reservations due to possible errors in data collection. They expressed their reproductive health data quality views in terms of data accuracy, completeness, and timeliness.

As described under Category 1.1.1, data accuracy is used to assess the correctness of the data by comparing data between facility records and reports, and between facility reports and the administrative database (Teklegiorgis et al 2016:2). There were variations in the participants' assertions regarding the accuracy of the reproductive health data produced at the facilities. Most participants indicated that, in general, data were accurate because it is verified. Also, some indicated that they have a dedicated staff member who offers only reproductive health services. This contributed to the accuracy of data as the person becomes more proficient with the programme's data management process. However, a few acknowledged the possibilities of errors in data entry.

> *I believe that we produce quality data because we check the correlation between the registers in the collection point with the data captured in an electronic MDS form that we are using, so there is a correlation in that regard. (P6)*

> *I think our reproductive health data is accurate because it is generated predominantly by one staff member, who becomes more efficient because they work in that area full time. (P3)*

> *In terms of data collection itself, we are doing well, except in some instances where during verification, you find that the tick is not in the right place. If such mistakes are missed, the quality will be affected. Our data will not be accurate. (P5)*

In their study, Kasambara, Kumwenda, Kalulu, Lungu, Beattie, Masangwi et al (2017:244) found that most health information officers believed that data produced by nurses were 85% accurate; they reserving the remaining 15% for the possibility of failures to record services. Studies have found variations in data accuracy level, ranging from 22.2% to 55% in Kenya, 33% to 62% in Tanzania, and 50% to 73% in South Africa (Hahn 2013:8; Kabakama et al 2016:88; Nicol et al 2016:62). Similarly, Jamin et al (2014:5) reported that HCPs in South Africa were not correctly marking up the registers. Furthermore, the possibility of ticking the inappropriate column in the register becomes higher due to the manual recording of services (Jamin et al 2014:5).

Concerning the completeness of data, the majority of participants believed that the data were complete in terms of monthly reports. However, some expressed uncertainties in terms of the completeness of data at the collection point, due to the possibilities of HCPs not recording some activities.

> *My monthly report is always complete. I enter data in all elements that we provide services on (P2)*

> *Our data is complete. When I send a monthly report, I make sure that all the elements are filled in, even with the services that we did not offer in the month, I put zero because there has to be a figure in there (P9)*

> *I cannot declare 100 % of completeness, especially in the rooms because I am not the one who is collecting the data. Some nurses still miss recording some activities. But I can say our monthly reports are always complete. (P3)*

Data completeness is one data quality dimension that is measured by assessing the extent to which the register and report include all data of interest (O'Hagan et al 2017:370; Teklegiorgis et al 2016:2). Literature has shown variations in the incompleteness of data. Several studies found that more than 80% of health information records were complete (Innocent et al 2016:8; Manya & Nielsen 2016:120; Nicol et al 2016:62). However, the study by Ahanhanzo et al (2015:840) reported incompleteness of data in records ranging from 81% to 89%. It was also found that the level of data completeness differs among programmes.

There were similar variations in terms of adherence or compliance with timelines. The majority of participants reported that facilities submit data to sub-district and the district office on time, but a few from different facilities acknowledged the late submission of reports due to a shortage of and multitasking data capturers.

> *We are doing 100% concerning sending data on time to the sub-district (P9)*
>
> *We are doing well, we are reporting within the timelines. On the 6th of every month, data is validated and sent to the district (P11)*
>
> *The data capturers, in addition to their daily data capturing, they have to do other jobs like archiving. They end up being unable to complete their allocated tasks. Should one be off, the data will not be captured on time resulting in late reporting. (P8)*
>
> *We are doing well on submission, but at times because we have one person who is capturing data and is not a data capturer, but a curtesy manager doing other responsibilities too. So if she is on leave, our submission time is affected because we do not have a person on a post of a data capturer (P10)*

Timeliness is referred to as the facility's submission of health information reports to the HIM directorate within the stipulated timeframe (Manya & Nielson 2016:119; Teklegiorgis et al 2016:01). Studies reported more than 78% of timely reporting over a given period (Innocent et al 2016:8; Manya & Nielson 2016:121). Conversely, the study of Kabakama et al (2016:88) found that 60% of reports were submitted late. Timely submission is critical because effective actions can only be taken based on current and up-to-date information (HISP [Sa]:84). In support of this study's findings, a lack of human resources was identified as one of the causes of late reporting. This is a hindrance to data quality, negatively affecting the use of routine health information on family planning services (Afe, Olatoun, Akinmurele, Abimbola & Agboola 2017:20; Shaikh et al 2015:30).

#### 5.4.1.2.2 Category 1.2.2: Impact of data quality on information use

Most participants expressed a good understanding that inaccurate data impacts the use of information for decision-making. They explained that incorrect decisions would be made and, accordingly, wrong actions could be taken in terms of planning, supplies, and the allocation of human resources.

> *We are going to make wrong decisions. You will think that people prefer certain methods only to find that you are wrong because the ticks were not in the correct place. You then order more of the method that people do not prefer and end up expiring. (P5)*

> *Inaccurate data does affect the use of information because that data is what we base decisions on. So, if it is not accurate, then the wrong decision will be made regarding budgets and staffing (P6)*

There was consensus among the majority of participants that incomplete data will incorrectly reflect the facility's performance, causing a lack of trust in the information, subsequently negatively affecting the use of information.

> *Incomplete data also has an impact on our performance because it does not give us a true picture of what is happening. Because we will be working hard, but the review will still show underperformance. The staff will end up not believing the information (P7)*

> *Firstly, it will not give a true picture of the services we are offering. So, it will misinform us and the district. We will end up developing plans that do not address our situation. For example, the data may say we have seen people on family planning; meanwhile, the stock was finished. (P10)*

Some participants' responses were in agreement that the late submission of reports and missing information from some facilities affect the quality of decisions made at the district level.

*Late reporting affects the decision-making process because the district will be making decisions from incomplete data if not all facilities have sent data on time. The quality of those decisions will be affected negatively by my data. (P6)*

*Late reporting affects the use of information because decisions are going to be made from incomplete information which does not give a true reflection for the district. Therefore dose decisions may be wrong (P8)*

Consistent with this study's findings, literature revealed the untimely reporting of health data as a barrier to HIM in middle-income countries (Afe et al 2018:217; Akhlaq et al 2016:1319; PEPFAR et al 2015:18). In Nigeria, incomplete data were found to be a barrier to the use of information in family planning services (Afe et al 2017:24; Afe et al 2018:218). Ohiri et al (2016:328) similarly assert that data of poor quality negatively affect programme decisions, especially where policies are based on the data.

#### 5.4.1.3 Subtheme 1.3: Collaborations and supportive supervision

Supportive supervision on data management is critical because health information is a core component in the measurement of the health system's performance (Nawaz, Khan & Khan 2015:109). Furthermore, the use of information in the health care facility is dependent upon the support and supervision provided on the use of information (Mucee et al 2016:665). Participants expressed their perceptions of collaborations and supportive supervision from health information officers; there were mixed feelings regarding the extent of collaborations. For this subtheme, two categories emerged: perceived support by health information officers, and areas for improvement.

##### 5.4.1.3.1 Category 1.3.1: Perceived support by health information officers

Health information officers are expected to support facilities in terms of data quality assurance measures, and they should provide performance feedback using tables and graphs (NDoH 2012a:16).

Some participants described support and supervision from health information officers as being good because the health information officers give them quarterly feedback

on previous performance, conduct support visits, and are always available to assist. An assessment of data quality and checking the availability of policies and guidelines were some of the activities conducted during support visits. Some participants, however, voiced their discontent with the level of support, as discussed in the next category.

> *Mmm, the support is good because they give us feedback, they conduct support visits, and they are always available to assist us in every way. The feedback is reflected in graphs for us to be able to see our performance on various indicators. (P2)*

> *When they visit, they first compare data from the MDS register with the data on the patients' files. They check the availability of policies, guidelines and the performance report given to us. They also interact with the clinicians and data captures to identify and address challenges. (P6)*

> *When we have a problem that needs their attention, I call them so that we address it. If it is something that they can resolve over the phone, then I implement that (P7)*

In addition, all participants stated that the health information officers convene quarterly performance review meetings where all facilities view their performance against that of other facilities. They alluded that the meetings encourage a culture of sharing best practices among facilities to improve the district's performance.

> *We meet with them at a central venue every quarter to look at the performance of every facility in the region. We voice our challenges, learn from each other, and share best practices (P5)*

> *We can identify facilities that are performing well and those are not performing. Facilities that are not doing well are encouraged to benchmark from the ones doing well so that the whole district can perform as required. (P7)*

Consistent with the study's findings, facility managers in South Africa reported having participated in a district meeting to discuss RHIS performance (Nicol et al 2017:28). Studies in Ethiopia and Rwanda also found that some HCPs had received supervision on routine health information utilisation and received feedback on submitted data (Dagnew et al 2018:4; Innocent et al 2016:10). In contrast, in Nigeria it was found that health facilities never received feedback on data submitted to the district (Adejumo 2017:48). According to the HISP ([Sa]:85) and NDoH (2012a:16), it is the function of the district health information officer to give feedback to the supervisors, facilities, and the district health management teams.

#### 5.4.1.3.2 Category 1.3.2: Areas for improvement

The majority of managers expressed their views regarding areas that needed improvement to support quality data generation. The main issue seemed to be a lack of visitation by health information officers in some facilities. Some managers found the practice of being called to a central location – typically the district offices – to be problematic because clinicians in the facilities are left unsupported. Some issues of 'problem-oriented' visits were also raised. However, a few participants alluded to a shortage of health information officers as a possible cause for the lack of support.

> *They do not visit the facility often. Three months can pass without any support visit from health information office (P3)*

> *We recently had a facility support visit which was supposed to be done every quarter but only done once a year. The quarterly meetings held at a central venue for all City of Tshwane clinics are not sufficient for us. It is a problem for them to come frequently to the facilities (P7)*

> *I think there are staff challenges. Instead of them visiting the facility for supervision, they call managers to a central area to cover many facilities at one time. This leaves the staff at the facility unsupported because we cannot close the clinic to attend the meeting (P1)*

*I think the support visit is triggered by the problems that we have encountered; if there are no problems, they do not come (P8)*

*Always when there is going to be an audit, you have somebody coming. It just seems like when something is happening, or a new thing coming, then there is a support visit (P3)*

It was evident from the discussion that most participants considered the support from health information officers not sufficient and needing improvement. Similarly, Mucee et al (2016:668) reported a lack of supportive supervision on the use of health information in Kenya, while Akhlaq et al (2016:1318) and Mimi (2015:149) found in their studies that support and supervision given to HCPs were not satisfactory. Cheburet and Odhiambo-Otieno (2016a:205) agree that management teams at various levels of care often do not provide support to improve RHIS data quality. In addition, they posit that the lack of regular supportive supervision negatively affects the perceived importance of data. However, while support and supervision have been neglected, it is a facilitator for health information exchange (Akhlaq et al 2016:1319).

### 5.4.2 Theme 2: The use of reproductive health information for decision-making

According to Afe et al (2017:9), the primary role of an RHIS is to generate high-quality data that can be used for evidence-based decision-making, policy formulation, and programme implementation and monitoring. All participants explained how they used reproductive health information for decision-making, and three sub-themes emerged, namely: dissemination of information, monitoring the performance of the reproductive health programme, and decisions taken to improve reproductive health services. The sub-themes and categories of Theme 2 are presented in Table 5.3.

**Table 5.3: The use of reproductive health information for decision-making**

| Theme | Subtheme | Category |
|---|---|---|
| **Theme 2: The use of reproductive health information for decision-making** | 2.1 Dissemination of information | 2.1.1 Reporting the service provided<br>2.1.2 Provision of feedback |
| | 2.2 Monitor the performance of the reproductive health programme | 2.2.1 Monitoring contraceptive utilisation rates<br>2.2.2 Monitoring the coverage of the target population<br>2.2.3 Ensuring sufficient resources<br>2.2.4 Budget and supply chain management<br>2.2.5 Comparison of pregnancies and contraceptive use |
| | 2.3 Decisions taken to improve the reproductive health service | 2.3.1 Patients' education and community mobilisation<br>2.3.2 Reduction of facility waiting times |

### 5.4.2.1 Subtheme 2.1: Dissemination of information

#### 5.4.2.1.1 Category 2.1.1: Reporting the service provided

Data are the raw materials that need to be processed into information before action can be taken (Zweigenthal et al 2017:224). As described earlier under Category 1.1.2, the majority of participants revealed that after subjecting data to verification processes, it is converted into reproductive health information to report on the services provided for the month. The report is compiled in a standard excel spreadsheet and transmitted to the district health information office.

> *After the data is captured, there is a summary spreadsheet report that is generated from the system. That is the one we use for reporting all monthly services, including the reproductive health to the district office (P2)*

> *As a facility manager, I sign the report to confirm the services provided (P9)*

Consistent with the findings, Asemahagn (2017:6) found that most facilities in Ethiopia were using routine health information to report on services to a higher level. The sharing of reports was also found to positively affect the working environment because it facilitates the development of strategies to solve problems (Somi et al 2017:84).

#### 5.4.2.1.2 Category 2.1.2: Provision of feedback

The majority of participants explained that they hold weekly meetings to convey and discuss the performance feedback reports and data quality. These are recognised as permanent items on the agenda.

> *At the end of the month, I can see the number of different contraceptive methods we have given. I will then give a report to staff members in our weekly meetings based on monthly reports sent to the district (P6)*

> *Coming back from the quarterly review meeting, we have to have a meeting where we are giving feedback. We discuss the feedback to make sure that we understand it and the implications when coming to the services (P11)*

> *We hold meetings to discuss DHIS issues related to data quality. We remind staff of the importance and the reasons for collecting data, with the belief that it will improve efforts towards collecting data correctly (P1)*

> *Data quality is very important in data management. That is the main reason why we discuss it regularly in our weekly meeting (P2)*

In their study, Nicol et al (2017:28) found that 98% of health facilities in South Africa had feedback reports available. In contrast, Asemahagn (2017:6) found that less than 25% of facilities in Ethiopia were using information for feedback purposes.

In Kenya, Cheburet and Odhiambo-Otieno (2016a:207) found different practices concerning the frequency of meetings to discuss data. Some facilities did not have existing meetings, while others held annual meetings, some quarterly, while only the minority held monthly meetings. In support of this study's findings, HISP ([Sa]:87) posit

that staff meetings should contain health information as the core of the agenda to ensure data quality and give performance feedback.

#### 5.4.2.2 Subtheme 2.2: Monitor the performance of the reproductive health programme

Data on the use of reproductive health information to monitor the reproductive health programme's performance revealed five categories: monitoring contraceptive utilisation rates, monitoring the coverage of the target population, ensuring sufficient resources, budget and supply chain management, and the comparison of pregnancy and contraceptive use.

##### 5.4.2.2.1 Category 2.2.1: Monitoring contraceptive utilisation rates

Discussions with the participants revealed that reproductive health information is used to monitor the utilisation of specific contraceptive methods, in terms of age and preference. Based on the reports mentioned, it appeared that SARCs, like oral pill cycles and injectable contraceptives were the most preferred compared to long-acting reversible contraceptives (LARC), like the IUCD and implant.

> *We are collecting data on contraceptive methods like depo, oral pill, nuresterate and others, comparing that with the total population of women of certain ages in a catchment area. In this case, it is women of childbearing age. Then we can see the methods that are preferred the most. (P1)*

> *Data show us that there are many clients on traditional short-acting methods like the injectable and oral contraceptives; at this point, we are trying to motivate for the long term acting methods like IUCDs (P6)*

The reproductive health programme's performance is measured according to the percentage of women aged 15 to 49 years who are protected against pregnancy by using modern contraceptive methods (Massyn et al 2019:155). According to O'Fallon and Bisgrove (2016:6), the goal for monitoring a reproductive health programme's performance is to improve the quality and the effectiveness of the service. Afe et al

(2017:17) agree that reproductive health data are used to assess the utilisation rate of contraceptive methods and predict trends with regard to specific methods. The authors further indicated that data are used to determine the acceptance of different contraceptive methods (Afe et al 2017:17).

#### 5.4.2.2.2 Category 2.2.2: Monitoring the coverage of the target population

The coverage of the target population is measured using the CYPR indicator. The CYPR measures the percentage of women aged 15 to 49 years who are protected against unplanned pregnancies through their use of contraceptives (Massyn et al 2015:140).

Participants explained that they used reproductive health information to see if they covered the target population in terms of reproductive health services in their areas. Each facility sets a quarterly and annual target based on the previous year's performance as a baseline, and it is reflected in the operational plan.

> *Data is used to determine if we have reached the set target for reproductive health. Every quarter, we review the indicators for the program to see the performance in relation to the set targets. So, we can see if we have performed well or underperformed (P2)*

> *I have an operational plan with baseline; annually, I would know what my previous year performance was. If I was at 60%, then it will become my baseline for this year and set a target for every quarter and the year*. I will then compare my actual quarterly performance for this year with the target *(P5)*

The study's findings contradict those of Innocent et al (2016:09), which revealed that operational plans from the health centres in Rwanda were not based on evidence. The baseline was not set using data from the health management information system, and none of the health facilities had a quarterly plan. Non-utilisation of routine health information poses a significant challenge to the improvement of the health system. PEPFAR et al (2014:74) allude that annual or operational plans should guide activities and ensure the project is on track to meet stated goals and objectives.

#### 5.4.2.2.3 Category 2.2.3: Ensuring sufficient resources

A few participants indicated that they use the obtained information to make decisions regarding the allocation of resources. Utilisation rates influence these decisions; higher utilisation of specific methods is indicative of increased interest. A response to this information would be to redirect resources for marketing-specific services that impact the performance of the programme and those providing certain services.

> *With the insertion of the IUCDs, if you only had 5 patients in the past 5 months and suddenly you are inserting at least 5 in a month. That shows an interest in it; then you can direct some resources towards marketing it more and more human resources to provide the service. (P1)*

> *I use the information to allocate human resources for specific programmes. For example, I can see from the data that this facility has a lot of clients utilising family planning service and less on chronic services. I therefore allocated family planning to more than one nurse (P9)*

Similar to these findings, in South Africa, health information was used to mobilise resources based on a comparison of services (Nicol et al 2017:28). Furthermore, studies conducted in Ethiopia and Rwanda found that health information was used for allocating resources, which included hiring more staff to improve services (Dagnew et al 2018:04; Innocent et al 2016:9). However, Mucee et al (2016:668) claim that in Kenya, resource allocation decisions were based on normative practices, providing little incentive for evidence-based decision-making.

#### 5.4.2.2.4 Category 2.2.4: Budget and supply chain management

A relatively moderate number of participants indicated that they use reproductive health data to budget for contraceptive methods according to usage, consequently preventing stock-outs and incidents of expired stock.

*Information also helps in terms of budget, how much you are going to spend on your contraceptive methods, based on how much is used in totality (P1)*

*There is a budget allocated for all the methods that we are using in reproductive health. My role is to make sure that methods are budgeted according to the use, and nothing expires because it is money (P8)*

Findings from previous studies also reveal that DHIS data were used to assess the use of medical supplies for the specific programme, to facilitate forecasting of stock requirements to minimises stock-outs, and for the procurement of medicine and drugs (Ohiri et al 2016:325; Kumwenda et al 2017:308; Innocent et al 2016:9; Dagnew et al 2018:4). Data are also used in creating a budget or assigning funding to services (Afe et al 2017:17).

#### 5.4.2.2.5 Category 2.2.5: Comparison of pregnancies and contraceptive use

Data from a few participants revealed that they used reproductive health information to assess the accessibility of reproductive health services and identify possible gaps in the programme. This is achieved by comparing unplanned pregnancy and abortion rates against the coverage of the target population. Participants believed that high pregnancy rates are related to non-utilisation of contraceptive methods.

*When we have cases of complications of illegal abortions being reported in the clinic, we then realise that some women are not using the methods even though they do not want babies. The 1st question we ask ourselves is, are our services accessible enough? Am I covering them enough with the family planning methods to prevent them from having unplanned pregnancies? (P1)*

*If you get higher teenage pregnancy, then you will know that there is a gap, you know that they are not even using the methods (P3)*

Vlassoff, Singh and Onda (2016:1026) posit that induced abortions due to unplanned pregnancies can be prevented by using an effective contraceptive method. In their study, Chola, McGee, Tugendhaft, Buchmann and Hofman (2015:11) reported that an

increase in the utilisation of contraceptives by 0.68% per year in South Africa would reduce the rate of unintended pregnancies and abortions by 23% by 2030. Although the emphasis was placed on the importance of family planning in the reduction of maternal mortality, it was found that many women in South Africa do not use contraceptives. This ultimately affects the reproductive health programme's outcome, which is to "improve maternal and child health" (Chola et al 2015:2).

#### 5.4.2.3 Subtheme 2.3: Decisions taken to improve the reproductive health service

Since the focus of the study was to evaluate the performance of RHIS in the generation and use of reproductive health information, it was important to know how the reproductive health information was used to improve the service. Most of the participants expressed the need to improve the reproductive health service and explained the measures they implemented. Two categories emerged from the subtheme: patients' education and community mobilisation and reduced facility waiting times.

##### 5.4.2.3.1 Category 2.3.1: Patients' education and community mobilisation

As described under Category 2.2.1, most participants realised that short-acting reversible contraceptive (SARC) methods were preferred over LARC methods. Data from participants revealed that they designed some strategies, such as health education and community mobilisation to increase women's awareness on the availability of LARC methods; these strategies are implemented at the facilities, communities and schools:

> *When I see that for a week there is no implant has been inserted. I will start encouraging Nurses to do awareness at the reception to ensure that they do more insertions. (P4)*

> *We have health promoters that go to the community and schools, and we also request them to talk about long-acting reversible methods. (P10)*

The low demand and uptake of contraceptive methods were attributed to misinformation about contraceptives' adverse effects (Lemani, Kamtuwanje, Phiri, Speizer, Singh, Mtema et al 2018:43). Thus, community mobilisation was found to be helpful in increasing the demand and uptake of contraceptive methods in communities where the demand and the uptake were low. Dagnew et al (2018:4) posit that information from the RHIS can be used to plan community mobilisation strategies and to share information with other facilities.

In the Democratic Republic of Congo, community mobilisation was achieved through the involvement of couples who were happy with the contraceptive method they used. The couples were encouraged to share their experiences during community events (Ho & Wheeler 2018:172). In addition, trained community HCPs were used to dispel negative rumours about IUCDs when visiting households (Ho & Wheeler 2018:172). This was found to have a positive impact on the uptake of IUCDs.

#### 5.4.2.3.2 Category 2.3.2: Reduction of facility waiting times

Some participants recognised gaps in the services and indicated that reducing the waiting times for contraceptive services was one of the strategies that they employ to encourage and motivate patients to use the service. They mentioned that all patients who require contraceptive service are promptly attended to. At the same time, those who attend the health facility for other services and also require contraceptives are managed at one service point.

> *Since we are not performing well, we have decided to fast track family planning so that clients do not stay long in the clinics (P6)*

> *Even school-going youth, we make sure that they do not stand in a long queue, the sister would put the queue on hold and attend to them first so that they can continue utilising our service. Those coming for their chronic service are also given the contraceptives in the same room seen for the chronic illness even though we know that family planning is done at the mother and child section. We do not want them to stay long in the clinic (P5)*

According to the NDoH ([Sa]:107), when patients are visiting the clinic for acute or chronic care, they should be attended to and offered a contraceptive method in the same consultation room. On a follow-up visit, patients will be fast-tracked to a specific room in the maternal and women's section, while adolescents and youth should be seen after school.

### 5.4.3 Theme 3: Views regarding the couple year protection rate (CYPR) indicator

The CYPR indicator is used to measure the percentage of women protected against pregnancy by using modern contraceptives, including sterilisation (Massyn et al 2019:155). In Theme 3, two sub-themes emerged: challenges with the CYPR indicator, and challenges with regard to improving the performance of the CYPR indicator. These sub-themes and categories are outlined in Table 5.4.

**Table 5.4: Views regarding the CYPR indicator**

| Theme | Subtheme | Category |
|---|---|---|
| **Theme 3: Views regarding the CYPR indicator** | 3.1 Challenges with the CYPR indicator | 3.1.1 Underperformance of the CYPR indicator<br>3.1.2 Uncertainty with regard to the calculation of the target for the CYPR indicator |
| | 3.2 Challenges in improving the performance of the CYPR indicator | 3.2.1 Issues of staff competence<br>3.2.2 Shortage of contraceptive methods<br>3.2.3 Collaboration between private and government sectors<br>3.2.4 Patients' preferences of contraceptive method |

#### 5.4.3.1 Subtheme 3.1: Challenges with the CYPR indicator

Data from most participants revealed challenges concerning the CYPR indicator, and two categories emerged: underperformance of the CYPR indicator, and uncertainty with the calculation of the target for CYPR.

#### 5.4.3.1.1 Category 3.1.1: Underperformance of the CYPR indicator

As described in Category 2.2.2, participants used reproductive health information to monitor the coverage of the target population using the CYPR indicator. All participants acknowledged that the facilities were not performing well on the CYPR indicator because they do not meet the set target. The non-satisfactory performance was attributed to patients' preference for SARCs (oral pills and injectable) as compared to LARCs (IUCD and implant). The LARCs were considered to have more impact in increasing the performance of CYPR as compared to SARCs methods. Participants acknowledged the need to increase the use of LARCs to improve performance and meet the set target.

> *You can issue so many condoms, so many oral pills or so many injectable but are not having much impact on the performance of reproductive health indicator, because CYP is more influenced by the long-term type of method like implant and IUCD (P2)*

> *IUCD and implants give protection to women for 3 to 5 years, unlike the oral and injectable. So, we need to give more long-acting methods for us to meet the target for CYPR. (P4)*

Massyn et al (2019:156) confirm that the reproductive health programme is not performing well on indicators for contraceptive prevalence, such as the CYPR. South Africa's performance declined from 70.6% in the year 2016/2017 to 59.8% in 2017/2018. Moreover, the Tshwane district rating has declined from 56% to 51.9% over the same period, failing to meet the set target of 59.8% (Massyn et al 2019:158). In addition, LARCs, like IUCDs, carry more weight on the CYPR indicator's performance than oral and injectable contraceptive methods (Massyn et al 2019:155).

Lemani et al (2018:43) assessed the effect that family planning interventions have on the CYPR in Malawi. Their study also revealed the importance of LARCs in increasing the performance of the CYPR. They found a positive correlation between an increase in CYPR and access and utilisation of LARCs, which was attributed to the training provided to HCPs on the insertion and removal of the LARC.

#### 5.4.3.1.2 Category 3.1.2: Uncertainty with regard to the calculation of the target for the CYPR indicator

Some participants expressed a challenge concerning the calculation of the target for the CYPR indicator. They specifically acknowledged a lack of understanding concerning whether the calculation is based on the catchment population or the facility headcounts. The target was considered to be unrealistic and unattainable because of a lack of evident improvement towards the target, despite efforts being made to increase performance.

> *The indicator is challenging. I am not sure whether the health information is using the facility headcount or the catchment population to calculate the target. We never reached it or even came close to the target regardless of how much we improve the service. (P5)*

> *Even if we increase the use of long-acting reversible contraceptives (IUCD and implant) the performance towards the target does not show much improvement. For example, in the last quarter, we inserted 200 implants and 50 IUCDs which was far more than what we used to insert in a quarter which was about 50 implants and 10 IUCDs but we only improved by 2%. I don't think we will ever reach the target. (P7)*

> *We see the target as being unrealistic and the district being unreasonable when setting the target. As a facility manager, I cannot even explain how the performance and target are calculated. (P8)*

According to Massyn et al (2019:155), the CYPR calculation involves an intricate formula based on the length of protection the method provides. The longer the protection, the more favourable outcomes. The indicator is calculated as the number of women aged 15 to 49 years using a contraceptive method divided by the total number of women aged 15 to 49 years in the population, multiplied by 100 and expressed as a percentage (Massyn et al 2019:155).

#### 5.4.3.2 Subtheme 3.2: Challenges regarding improving the performance of the CYPR indicator

As discussed under Category 3.1.1, participants acknowledged that the reproductive health programme was not performing well. There were also impediments to effective use of the information to improve the programme's performance. The challenges were categorised as: issues of staff competence, a shortage of contraceptive methods, a collaboration between private and government sectors, and patients' preferences of contraceptive methods.

##### 5.4.3.2.1 Category 3.2.1: Issues of staff competence

Earlier in Category 3.1.1, participants recognised the significance of LARCs improving reproductive health programmes' performance because they yield better results when the CYPR is calculated. They acknowledged the lack of skilled staff members able to offer LARCs as a barrier to improving the programme.

> *We discovered that the reason for the poor performance is the lack of skills in inserting long term methods. IUCD contribute more to the performance as compared to others and that is the one we having the skills challenge on. (P2)*

> *Performance is a problem because some of the staff cannot insert the IUCD and the implant because they are not skilled on insertion. (P10)*

When asked for a reason for the lack of skilled nurses and doctors who are able to insert IUCDs, some participants mentioned a lack of training because there was no trainer. The majority mentioned incompetence among the staff who are trained due to a lack of practice.

> *We all not trained on IUCD, training department could not provide training because they did not have a trainer for IUCD (P9)*

*Our staff are trained with contraceptive services, but when they were trained they never got an opportunity to practice the insertion of an IUCD and hence they are not competent on that aspect (P2)*

*Even the doctor said that she is not competent enough to insert an IUCD, because she has never done it after the training (P4)*

Similarly, several studies found that the majority of HCPs lacked skills in the insertion and removal of LARCs because of their lack of training (Agha & Williams 2016:330; Lemani et al 2018:41; Silumbwe, Nkole, Munakampe, Milford, Cordero, Kriel, Zulu & Steyn 2018:5). Agha and Williams (2016:330) also found that a lack of confidence in the insertion of LARCs was a barrier that had negative implications on the adoption of the method by the patient.

#### 5.4.3.2.2 Category 3.2.2: Shortage of contraceptive methods

A moderate number of participants identified a shortage of injectable contraceptive methods as a barrier to the use of information to improve the performance of the reproductive health programme. They recognised that the shortage worsens poor performance because injectables are the most preferred contraceptive methods.

*The reasons currently it is lack of methods, we are running short of nuresterate and petogen (referring to injectable contraceptives) will be depleted very soon, and those are the most used methods in the facility as compared to the others methods. (P7)*

*At the time the other methods are out of stock like now we don't have the nuresterate, and most of the people want the nuresterate. So how are we going to improve if we don't have supplies? This affects performance worse. (P10)*

*As I said that we are not performing well and is difficult to improve because depo is out of stock. We need enough stock to perform. (P11)*

Similarly, Babazadeh, Lea, Kayembe, Akilimali, Eitmann, Anglewicz and Bertrand (2018:160) found that in the Democratic Republic of Congo, 42.5%, 41.5% and 38.5% of service delivery points had stock-outs of injectable, implants and emergency contraceptives, respectively.

#### 5.4.3.2.3 Category 3.2.3: Collaboration between private and government sectors

Participants expressed that some patients use private practitioners for contraceptives because they are employed, and the private facilities attend to them much quicker than the public facilities. They were uncertain about private practitioners' practice of reporting the service provided on the RHIS because the patients seen by private practitioners form part of the facility's catchment population. They raised concerns about the population not utilising their service because it negatively impacts the facility's overall performance.

> *We having low uptake of the methods from the public because we are serving a working community. They use private providers because they can walk in and they are given the injection and they go back to work immediately. Where else with us they need to queue for a file, go for observations and then go to the sister (P6)*

> *There are private providers outside the facility that offers the same method and affect our performance because I don't have proof that they submit the data to DHIS. The patient living in our area will come to the facility with an IUCD inserted from the private facility. One would wonder if the service was reported on DHIS because they form part of my catchment population (P1)*

When prompted to elaborate on how the use of private practitioners affect their performance negatively, participants stated that facilities have a target population for programmes and are expected to reach the set target. They shared that if the target is not reached, then the facility will be regarded as not performing well and the population not being covered. However, some of the population is covered by private practitioners.

*I have a target population that I have to cover according to DHIS. So if I have 100 females as my target and I only give methods to 10. The assumption is 90 is not covered. So I will be seen as not performing, while actually 50 is covered by private practitioners but is not accounted for (P1)*

*We set targets for every program and we are expected to meet them. But we not reaching the target because our community is not using our services but the private service. (P6)*

HISP ([Sa]:31) alludes that each healthcare facility has a catchment population. However, people may not utilise facilities close to their homes but use ones close to their work or transport route. In support, Young (2016:09) found that private health facilities in South Africa had shorter waiting periods than public health care facilities. In their study measuring family planning quality and its links with contraceptive use, Fruhauf, Zimmerman, Kabira, Makunbi, Gichangi, Shiferae et al (2018:837) discovered that 37% of women of reproductive age purchased their contraceptives from a private health facility, while 25% of women living close to the public facility obtained their contraceptives from private facilities. Furthermore, it is believed that 20% of the population in South Africa receives health care services from private providers. It has thus been reported that the CYPR data for South Africa represent the provision of contraceptives in the public sector only (Massyn et al 2019:99).

The quality of public health facilities' family planning services was found to influence the use of contraceptive methods. High-quality family planning services in the public sphere were associated with modern contraceptive methods (Fruhauf et al 2018:837).

#### 5.4.3.2.4 Category 3.2.4: Patients' preferences of contraceptive method

Some participants recognised patients' right to choose methods they feel comfortable with. They indicated that most patients prefer SARCs to LARCs because of their unfamiliarity with the methods and lack of knowledge. Participants also acknowledge that HCPs do not market the LARCs appropriately because of their lack of confidence in administering the methods.

*Our clients are used to the injections and pills. The IUD was there a long time ago then disappeared and comeback recently around 2014 and the implant is new in South Africa so our people don't know much about them. (P9)*

*People do not like the long term methods, like the implant and the IUCD. They prefer the injections and pills because the long methods were not well marketed because only a few nurses are confident in inserting an IUCD. (P10)*

In addition, a few participants reported that some patients fear that the IUCD may damage their uterus and cause infertility. They claimed that some patients fear the implant's side effect and the thought of having a foreign object in their bodies. Furthermore, participants revealed myths about the implant causing skin cancer and causing immovable joints.

*They are foreign bodies inserted in one's body, people are afraid of them. They say the IUD may damage their wombs and never have babies again, while others say that makes people sick. (P9)*

*Other people say the implant causes heavy menstruation. (P10)*

*The other thing is the myths that are there pertaining to the long contraceptive methods like IUCD and implant. The one myth about the implant is that it causes cancer of the skin they say after the insertion, they are not able to use that hand because it locks their joints (P7)*

Notwithstanding the non-preference for LARCs, the participants acknowledged that among the LARCs, the implant is the preferred method, compared to the IUCD. However, they recognised that the insertion and the removal rates of the implant are the same because of complaints concerning the side effects.

*Some people are inserting the implant as compared to the IUD, but the removal rate is more at the same rate as the insertion rate. (P10)*

*With the Implanon the more we insert there more people come back for removal before due date, the numbers of insertions are almost equal to the removals. One of the reasons why they remove is because they say is causing prolonged and heavy menstruation. Others mentioned weight gain too. (P11)*

Similar findings were reported in the Democratic Republic of Congo, Ethiopia, Kenya, Uganda, Burkina Faso and South Africa, where a majority of women preferred SARCs, such as injectables, pills, and condoms because they could stop using it at any time (Fruhauf et al 2018:834; Ho & Wheeler 2018:166; HST 2016:100). Thus, although most women preferred short-acting methods, the implant was the most preferred long-acting method because it could be removed at any time (Ho & Wheeler 2018:167); HST (2016:103) highlighted a concern in the number of women returning for implant removal within a few months of insertion.

Consistent with this study's findings, myths about LARCs were reported in the Democratic Republic of Congo. Women reported that IUCDs cause infection, which may lead to cancer, diabetes, it can get lost in the body, is a permanent contraceptive, and an injection into the vagina (Ho & Wheeler 2018:169). In Pakistan, the majority of women were not utilising long-term methods like IUCDs and hormonal methods like oral contraceptives because of the belief that hormonal methods will harm their reproductive abilities. The women instead adopted methods like coitus interruptus (withdrawal) and condoms (Agha & Williams 2016:330).

### 5.4.4 Theme 4: Evaluation of the programme's performance

In 'Theme 4: Evaluation of the programme's performance', three sub-themes emerged: perceived successes, challenges with effective data management, and opportunities for improvement. These sub-themes and categories are outlined in Table 5.5.

**Table 5.5: Evaluation of the programme's performance**

| Theme | Subtheme | Category |
|---|---|---|
| **Theme 4: Evaluation of the programme's performance** | 4.1 Perceived successes | 4.1.1 Managing data quality<br>4.1.2 Accessing information<br>4.1.3 Building a culture of health information |
| | 4.2 Challenges with effective data management | 4.2.1 Challenges related to technical factors<br>4.2.2 Challenges related to behavioural factors<br>4.2.3 Challenges related to organisational factors |
| | 4.3 Opportunities for improvement | 4.3.1 Data collection processes<br>4.3.2 Improving the usability of the data collection tool<br>4.3.3 Preparing nurses for HIM<br>4.3.4 Ensuring sufficient human resources<br>4.3.5 Increasing support visits by health information officers |

### 5.4.4.1 Subtheme 4.1: Perceived successes

Data revealed consensus among the majority of participants with regard to the performance of the RHIS, and three categories emerged: managing data quality, accessing information, and building a culture of health information.

#### 5.4.4.1.1 Category 4.1.1: Managing data quality

Most participants were in agreement that several data quality assurance measures are in place. In addition to the data verification process described in Category 1.1.1, there was some consensus regarding the system's software functionality in terms of auto checking, which enhances the quality of data. The system can validate data based on the embedded rules which assess the correlation between data elements. However, participants could not expand on any reproductive health data validation rules that are embedded in the system.

*The electronic spreadsheet we are using has validation rules, so it can pick the errors or outliers which are highlighted in red. You then be able to go back to the sister's register and patients' file to verify to ensure that what is captured is true (P2)*

*Unfortunately, I cannot think of any validation rules that are specific to family planning. (P6)*

Consistent with these findings, the electronic system in Botswana had validation rules on the user's interface to improve data quality (Seitio-Kgokgwe et al 2016:5). In contrast, Innocent et al (2016:9) found no quality control measures in Rwanda when paper-based data were captured into the computer.

#### 5.4.4.1.2 Category 4.1.2: Accessing information

Some participants with access to the internet indicated the advantages of having access to information. They can access the system through a shared drive platform called the "Q-drive". In addition, the same participants asserted that the information is also displayed in graphs on the notice boards in the facilities for easy access to all staff members.

*In addition to the performance feedback we are receiving, the information is available all the time on the intranet, a Q-drive system, whenever you need it you can access and review (P3)*

*The information is readily available. The heath information office continuously update the pivot table on the Q- drive system, it is assisting us a lot for us to update the operational plans in time. (P5)*

*We have graphs displayed in the clinic's notice boards. The staff can view data from the graphs. (P6)*

The finding is consistent with those by Nicol et al (2017:28) and Hazel, Chimbalanga, Chimuna, Nsona, Mtimuni, Kaludzu et al (2017:364), who reported that routine health

information was displayed on charts and tables in half of all health facilities in South Africa and Malawi, respectively. However, Teklegiorgis et al (2016:5) claimed that only key indicators were displayed in tables in more than half of facilities in Ethiopia. In Kenya, the graphical presentation of data was used to identify abnormal trends of data (Cheburet & Odhiambo-Otieno 2016b:137).

#### 5.4.4.1.3 Category 4.1.3: Building a culture of health information

According to Jylhä, Mikkonen, Saranto and Bates (2017:e20), an information culture reflects the organisational values, norms and practices for managing information. Mukred and Singh (2017:266) further describe information culture as patterns of behaviours and attitudes that express an organisational orientation towards information. In addition to the use of reproductive health information, the culture of information was illustrated by the availability of governance in data management and the implementation of participative management styles to data management.

All participants reported on the existence of governance in data management because a policy and SOP for HIM is available. They indicated that the DHMIS policy and the DHMIS SOP are accessible to all staff members. They recognised the usefulness of the documents because they provide guidelines with regard to staff members' responsibilities, the data flow, and the reporting lines from the facility to the national level. Hence, they keep a record of staff accessing the documents.

> *The DHMIS policy and the SOP are kept in a file in the office, everyone is aware and encouraged to come and refer to them if they need to. (P6)*

> *The policy and the SOP are very important and useful because they describe data flow, when to report to the district, and the responsibility of all categories of staff members in the clinic (P1)*

> *If there is a new SOP, we sit together and discuss it and let everyone acknowledge that they are aware of the content of the SOP. (P8)*

Similar to this study's findings, Wandera et al (2018:19) claim that facilities in Uganda had standardised data transmission procedures, where facilities were reporting directly to the district. On the contrary, Somi et al (2017:86) found no governance in data management in Tanzania. There was no policy for data flow and information use, making it easy for stakeholders to develop their own parallel subsystems for data management. In Kenya, the data management SOP was reported to be available to only 40% of HCPs. Among the 40%, only 25% were orientated on the SOP content (Cheburet & Odhiambo-Otieno 2016a:204). Similarly, it was found that in Kenya and the Democratic Republic of Congo, there were minimal or no organisational SOPs regarding data management. As a result, HCPs had limited understanding of data management processes and use, and whether it is part of their responsibility (USAID & MEASURE Evaluation, 2018d:33).

With regard to a participative management approach, the majority of participants recognised the need to involve staff members in decision-making and problem-solving processes. Although all staff members are involved, the responsibility for undertaking decisions and developing action plans is placed on the champion of the programme. They explained that the facilities have a champion for reproductive health service and a champion for data management. The champion is a staff member who was nominated based on displayed interest and longer experience with the service.

> *In the clinic, we have champions in each service. The champions take responsibility for that service. The reproductive health champion discusses the program challenges in our weekly meetings. Other staff members are allowed to share inputs in order to develop action plans for improving the services (P3)*

> *When we are not performing well, I will make the staff aware. For example, if we identify the number of IUCDs inserted in a particular month was low, we sit and highlight the areas that need improvement. (P4)*

> *The champion identifies problems that need to be corrected and share with all the staff members. Then we sit and discuss on how we can improve (P11)*

The staff meetings mentioned in Category 2.1.2 provide a platform for discussing action plans that will enable facilities to reach set targets. Participants acknowledged that staff members only take ownership of decisions that were agreed on by all staff members and the manager, not plans that are forced on them. Hence, they involve staff members in decision-making at all times. Staff members are thus afforded a sense of responsibility and independence by being allowed to decide and implement solutions concerning the management of contraceptive stock-outs; they only involve the manager when the problem is complex.

> *We all decide on how to improve the performance in our meetings. It is an active participatory meeting. No decision and plans are forced upon the staff. (P8)*

> *If there's any problem, I let them decide what to do, and see how to resolve it, they come to me only when they have failed or they can't manage it (P7)*

> *I encourage them to come up with solutions and make decisions, especially when coming to stock management and service issues. For example, if we run out of nuresterate, I don't expect them to wait for me and say the method is finished. I expect them to liaise with the champion and call the central pharmacy to check if there is stock and order immediately. We will then discuss later in the meetings on how to prevent further stock shortages (P5)*

Booyens and Bezuidenhout (2018:465) assert that participative management involves supervisors meeting with staff members to make decisions and plan activities affecting service provision. Consequently, employees' motivation is increased, and resistance to new methods and processes is decreased (Booyens & Bezuidenhout 2018:465). Cheburet and Odhiambo-Otieno (2016a:206) further allude that encouraging staff to design innovations to improve data quality was found to be a motivating factor in ensuring that captured data met the required quality status. In addition, to ensure the effective use of routine family planning data, studies recommend that facilities should involve all stakeholders and all family planning service providers in decision-making regarding the programme (Afe et al 2017:27).

#### 5.4.4.2 Subtheme 4.2: Challenges with effective data management

According to Mucee et al (2016:661), generating quality data and using information is determined by several factors, including technical, behavioural and organisational factors. Poor-quality data results in a lack of trust in the RHIS and non-utilisation of health facilities' information (Innocent et al 2016:6). Participants described the factors affecting reproductive health data management, and three categories emerged: technical factors, behavioural factors, and organisational factors.

##### 5.4.4.2.1 Category 4.2.1: Challenges related to technical factors

Technical factors are related to the system, the methods, and processes for managing health information. They include the design of the reporting tools, procedures, and computer software for data processing and analysis (Teklegiorgis et al 2016:8).

The majority of participants described the current data collection tool used in the facilities as not being user-friendly. They cited congestion of the tool due to many data elements and the small font making it difficult to read and time-consuming to complete. Some participants believed that congestion was due to the tool containing some data elements that are not relevant to the facilities. Accordingly, data entry errors occur, especially among the staff members who are not familiar with the tool.

> *The writing on the data collection tool is very minute, quite small. It is also too congested, with a lot of data elements on one page. Some data elements on the tool are not relevant for us, we don't collect them because we don't offer the services. They just add to the congestion, for example in small clinics we do not have an MOU (maternal and obstetric unit), but the tools have PCR done at birth element. We don't do PCR at birth (P1)*

> *The tool is congested, making it difficult for the newly employed staff to enter data. The new staff spent a lot of time completing the tool because they need to read the elements one by one until they get to the one they are looking for. It is a struggle. (P6)*

Several studies found health formation data collection tools not user-friendly. The tools in Benin, Nigeria and Pakistan were deemed to be complex, with many unnecessary columns (Ahanhanza Ouedraogo, Kpozèhouen, Coppieters, Makoutodé & Wilmet-Dramaix 2014:6, Adejumo 2017:47; USAID & MEASURE Evaluation, 2018a:22). Other studies in Kenya and Rwanda reported multiple data collection tools, which affected data utilisation negatively (Mucee et al 2016:667; Innocent et al 2016:10).

#### 5.4.4.2.2 Category 4.2.2: Challenges related to behavioural factors

Motivation, attitudes, knowledge, understanding, and values that people hold related to HIM are the behavioural factors that affect data quality and information use (Mucee et al 2016:669).

Some participants mentioned non-compliance to the SOP, lack of understanding the importance of data collection and the meaning of the data elements, and the HCPs' attitude as contributory factors to poor data collection.

As described under Category 4.1.3, access to the guidelines did not translate to error-free data generation. A few participants indicated that some staff members do not comply with the SOP requirements. The main issue seemed to be incomplete recording:

> *There are other staff members who will still omit other aspects of data, like not ticking properly and not aggregating the data at the end of the day (P1)*

> *Some nurses do not follow the guidelines in the SOP and this results in underperformance in the service, reasons always give is that they sometimes forget to tick on the register (P8)*

Although most participants believed that some staff members collect data correctly, a few acknowledged a lack of interest, disregard for the importance of data, and negative attitude towards data management among other staff members. They lamented that some staff members continued to collect data incorrectly despite the support they received, such as in-service training and feedback. They recognised the cause of the

attitude as being the perception that the responsibility of data management only lies with the manager and the data capturer.

> *There are staff members who really and truly understand data elements concerning family planning and collect data correctly. Some just collect the data for the sake of collecting, not even considering the importance of data in reflecting the service provided*. *(P8)*

> *The most cause of incorrect data is when the nurses forget to tick after they provided the service, or recording incorrectly, for example, instead of stating the number of packets of oral contraceptives they gave out, they just a tick in a cell. It is then counted as one packet. Leading to, reporting a lower number of oral contraceptive issued (P7)*

> *Staff attitude, I am giving information and feedback but you'll find one or two members having attitude and ignorance towards the whole process of data collection. They are informed but they continue doing what is not right, in the end, the data are not of good quality. (P5)*

> *Some nurses have negative attitudes towards data management because they view it as the responsibility of the manager and the data capturer. The staff will say "I am expected to see patients and I have seen patients. I work until here, data is not my responsibility" (P8)*

Negative attitudes towards data management were reported in Pakistan, South Africa and Malawi. The attitudes of HCPs were found to affect the quality of data and was a contributory factor to the overall underperformance of the health programme (Shaikh et al 2015:30; Nicol et al 2017:33; Kumwenda et al 2017:308). In addition to attitude, studies have found that unclear expectations towards HIM and a lack of recognition for quality data and the use of information affect people's motivation towards data management (Cheburet & Odhiambo-Otieno 2016b:137; Cheburet & Odhiambo-Otieno 2016a:206; Mucee et al 2016:664).

#### 5.4.4.2.3 Category 4.2.3: Challenges related to organisational factors

Planning, the availability of resources, supervision, training, finances, and information distribution are organisational factors that can affect the performance of the health information system (Teklegiorgis et al 2016:8).

Data from participants revealed a shortage of resources, specifically human resources and data collection tools, as barriers in the data management process. The majority of participants acknowledged that a shortage of human resources causes work pressure, resulting in HCPs postponing data collection for later. They explained that some nurses send files to the pharmacy to collect medicine before recording, or planning to collect them later to record. They recognised that the practice results in data collection errors because some forget to record, while some files get lost in the process, resulting in decisions being taken based on incorrect data.

> *We are not well capacitated in terms of staff. Shortage of staff results in nurses focusing on attending to the patients and postponing recording in the register (referring to the MDS data collection tool). Some files are sent to the pharmacy for medication and have to be requested later for recording. The practice results in many gaps in data collection because some files go missing (P4)*

> *When we are short-staffed, nurses will be pushing the queues so that all patients can be seen before the clinic closes and keeping files aside for recording later. Ending up not recording some services because they forgot. This affects the use of information badly because when the data is not recorded properly, decisions are made out of incorrect data which may not be effective in improving the service (P8)*

In support of these findings, Wandera et al (2018:22) reported a shortage of human resources for family planning in Uganda. The shortage resulted in heavy workloads for staff, negatively affecting the completeness, timeliness, and quality of data. In addition, Somi et al (2017:88) reported insufficient human resources in many service areas in Tanzania causing HCPs to give less priority to data management because they had multiple tasks to complete. Furthermore, Nicol et al (2017:34) found that

facility managers were expected to perform clerical and data capturing tasks because of staff shortages.

A relatively moderate number of participants mentioned that the shortage of tools occurs mainly during transitions between data collection tools. As a result, one tool will thus be utilised by more than one staff member, or they continue using old tools. This affects the quality of data.

> *Sometimes you find that there is a shortage of reporting books (referring to the data collection tool). Staff are expected to share. The shortage usually occurs when there is a change to a new version (P3)*

> *When we don't have enough tools, data quality is affected because some nurses continues with the old tool which has old data elements which may have a different meaning as compared to the new ones (P8.)*

Shortages of data collection tools in Uganda were found to affect data accuracy and reporting timelines negatively (Wandera et al 2018:22; Yourkavitch et al 2016:1168). Furthermore, the use of older versions of registers that do not correspond with the reporting requirement was identified in South Africa (Jamin et al 2014:5; Kaposhi, Mqoqi, Schopflocher 2015:551). In contract, Innocent et al (2016:7) assessed the quality and use of routine health care data in Rwanda and no stock-outs of data collection tools was reported in any of the facilities.

Besides a lack of resources, participants reported a lack of formal training on the RHIS – especially among newly employed staff – as a barrier for correct data management and information use. They all stated that few staff are trained on the RHIS. Participants recognised that a lack of training causes difficulty in understanding the importance of data collection and its impact on facilities' performance.

> *Only few clinicians are trained on DHIS (referring to RHIS), I have three trained out of ten trained. (P6)*

> *I have only two members trained on RHIS out of ten. (P4)*

*The challenge, is the lack of training, especially for the new staff members. The new staffs are always not sure and battle with the data collection. They also struggle to understand the importance of data. (P3)*

*It is difficult for the staff who is not trained on DHIS (referring to RHIS) to understand the importance of collecting data correctly and how does it affect the performance of the clinic. You will try as the facility manager to explain but is difficult without formal training (P8)*

Some participants could not recall the frequency of the training being presented and the last time it took place. Others mentioned that it used to take place once per annum.

*Previously the five days training used to be there, I don't know when was the last time it took place. I don't know if it is still existing or what (P4)*

*The training comes very seldom, maybe once a year or even once in two years sometimes (P3)*

*The training is once in a year, but last year "I don't remember it taking place" (P5)*

Although participants claimed that training rarely takes place, they acknowledged that it provides adequate knowledge required for data management and the use of information in monitoring the programme's performance.

*The content of the training is adequate, the focus is on all data management tasks, from data collection up till submission. They are taught how to analyse data, from the analyses you can see how your program is performing. For instance, if you see a decrease in the number of methods given you can say to the staff, let's give education about family planning (P6)*

*The training is adequate, firstly they inform the trainees about the meaning of data elements, the importance of collecting data, the importance of data in*

*planning for the facility and the district. They teach them how to monitor the clinic performance (P8)*

Furthermore, a minority of participants acknowledged that a lack of training updates, specifically for managers, prevented them from executing their duties correctly.

*Me as a facility manager, I am expected to do my work properly but at times is not possible because I was trained long time ago and not received training updates or refresher course. (P8)*

*People look at facility managers and saying that they are not performing their duties as expected. Things are forever changing, even myself as a facility manager I attended that training of 7 years ago and there is no update (P4)*

These findings are supported by literature that emphasises that a lack of training causes staff to feel overburdened and unable to perform their tasks efficiently, consequently affecting data management and information use (Akhlaq et al 2016:1318; Dagnew et al 2018:4). Wandera et al (2018:22) assert that a lack of training negatively affects data quality in terms of accuracy and completeness. Furthermore, not understanding data management results in nurses not generating the service delivery information necessary for decision-making (Kaposhi et al 2015:551). In addition, Dagnew et al (2018:02) found that in Ethiopia, managers at lower levels of the health care system had a minimum understanding of the use and benefits of health information due to a lack of training.

In contrast to this study's finding, Innocent et al (2016:9) claim that in Rwanda, managers were trained on data management processes and tools, and all managers received refresher training within three years preceding their study.

#### 5.4.4.3 Subtheme 4.3: Opportunities for improvement

##### 5.4.4.3.1 Category 4.3.1: Data collection processes

Some participants expressed the need to discontinue the use of paper-based registers. They explained that it would be better if the HCPs capture data into the web-based DHIS in the rooms immediately after each service, rather than recording on paper and waiting for the data capturer to capture the data at a later stage. They regarded the immediate capturing of data as a better mechanism to facilitate the prompt generation of reports. Furthermore, participants believed that immediate data capturing into the web-based DHIS would prevent data collection errors like missed ticks and ineligible handwriting.

> *I think it will be ideal if web-based DHIS systems can start in the rooms where the clinicians after seeing the patients can captured directly on the system and the system generates the report at the same time. Rather than waiting for a data capturer to capture, then generate a report. (P2)*

> *It will be easier if we have resources like computers so that professional nurses could capture data electronically, totals will be automatically calculated and the data capturer will only consolidate the data. Rather than struggling to read handwriting, missed ticks and all that. (P9)*

Paper-based tools were time-consuming, not easy to manage and expensive, while computer-based tools were considered efficient and effective (Kumwenda et al 2017:308). Computerisation of the existing manual system of data collection was found to be a facilitator for the sharing and use of information (Akhlaq et al 2016:1319).

##### 5.4.4.3.2 Category 4.3.2: Improving the usability of the data collection tool

As discussed under Category 4.2.1, some participants recommended the removal of data elements that are not relevant to the facilities from the tool. They believed that the reduction of data elements would improve the usability of the tool.

*I feel that the tool should only contain data elements that are specific for us, that will be used for decision making. Some data elements are in the tool but not collected because they are not specific to us and are there which make it more congested (P1)*

*Having fewer indicators will make the tool easy to use, some indicators are collected for no reason. I think we need to collect information that we need, not information that is not going to be used anywhere (P3)*

Kabakama et al (2016:90) found that collecting many data elements that are not utilised overburdens the HCPs and may negatively affect compliance and adherence to reporting requirements.

#### 5.4.4.3.3 Category 4.3.3: Preparing nurses for HIM

The majority of participant identified the need to train health care professionals on data management. Some recommended that the training should form part of the nursing curriculum at the colleges. Moreover, participants believed that the training would increase HCPs' understanding of data management processes, including the interpretation and use of information for planning purposes.

*I think it should be part of the training for the professional nurses at the colleges before they come to the facilities because now they come to the facility not seeing the importance of data (P10)*

*If professional nurses are trained on the 5 days course, that will help then to understand the use of information, because they will be able to interpret graphs, how they are developed and how the tick contribute to those graph and assist in planning for our services. (P5)*

*We need training more training, I think DHIS training would enlighten and help the clinician to understand better when it comes to data management. (P3)*

In Zambia, the HMIS training has been incorporated in the curriculum for the diploma in nursing science. However, it was deemed insufficient in improving the human resource for HIM (Kiwanuka et al 2015:10). Furthermore, Kiwanuka et al (2015:10) posit that to build human resource capacity for health information, there is a need for collaboration between development partners and educational institutions.

The improvement to the health information system requires attention to be given to training, with the focus on improving data management skills, including data collection tools, and the importance of collecting good quality data (Cheburet & Odhiambo-Otieno 2016a:205; Shaikh et al 2015:30; Kumwenda et al 2017:309; Afe et al 2017:19). Training should be comprehensive and include proper use of registers, the meaning of data elements, and indicators and interpretation of data (Jamin et al 2014:6). Although regular training was found to be important, team-based training was considered more effective than individual training when learning complex technology (Akhlaq et al 2016:1321). In addition, HISP ([Sa]:95) recommends formal in-depth training on data management at the district level, especially for facilities' information teams.

As discussed earlier under Category 2.1.2, participants emphasised the need for reproductive health training, especially on the insertion of IUCDs. They anticipated that the training would improve the performance of the programme.

> *If the staff can be trained on the insertion of the intrauterine device, we will be able to insert more devices and that will improve our performance. (P2)*

> *We need more training for the clinicians, we want to insert as many IUCD as we can to improve our performance. (P11)*

Inadequately trained staff were found to be a barrier to providing LARC methods like IUCDs and implants. Therefore, skilled HCPs are critical in providing for the community's contraceptive needs at large. Training interventions are recommended to increase staff competencies, specifically in the provision of LARCs (Lemani et al 2018:43).

#### 5.4.4.3.4 Category 4.3.4: Ensuring sufficient human resources

Most participants suggested recruiting data capturers and HCPs to facilitate correct data collection, daily capturing, and timeous submission of reports. Accordingly, the generated information will be utilised for planning because it will be correct.

> *The district should recruit data capturers so that data can be captured daily and the report is generated on time for submission to the district. (P10)*

> *Barriers like staffing should be addressed because if you are well-staffed nurses will be able to collect data correctly. They will not miss anything. Our data will be good and the plans generated from it will be correct and addressing our situation not the other way round. (P4)*

Similarly, in Malawi, the recruitment of data capturers was recommended as a strategy to improve health information system performance (Kumwenda et al 2017:309). Prioritising the staffing process was also recommended in a study conducted in Nigeria because understaffing was found to be one of the causes of poor data quality. Family planning workers were seen to have a lot of responsibilities, making it difficult for them to collect data correctly if they are not sufficiently staffed (Afe et al 2017:27). Hiring more staff were suggested to facilitate HIM and information sharing (Akhlaq et al 2016:1319).

#### 5.4.4.3.5 Category 4.3.5: Increasing support visits by health information officers

Most participants expressed a need for consistency and continuous support from the health information officers in addition to data verification meetings held every month at the sub-districts. They recommended quarterly support visits by the health information officers to identify challenges experienced at the facility level. In addition, participants suggested that the health information officers should not only monitor the availability of quality improvement and action plans, but its implementation as well.

*If there can be consistency in the visits that the health information officers are doing, at least once in a quarter. The visits will encourage managers to discuss performance and come up with an action plan. Without monitoring, people tend to neglect data management. (P4)*

*As I have told you that they come once in six months, maybe if they come on a quarterly basis. During the visits, they must not only check data quality issues but also check if we are implementing the quality improvement and the action plans. (P6)*

*We expect them to support more than they (referring to health information officers) are supporting because we meet once a month at the sub-district to interrogate data. But we need them to come to the facility and be part of the assessing the data from the source so that they can pull the data source and check to see where we are having challenges (P10)*

On-the-job support from health information officers was found to be a contributory factor to the successful implementation of the DHIS (Kiwanuka et al 2015:7). In addition, Jamin et al (2014:6) recommended that an audit team be formed, which includes sub-district programme and information managers, data capturers, and clinic supervisors to provide support and supervision to the facilities. The supervision should include the verification of the previous month's data, data quality checks, and the provision of in-service training on the gaps identified (Jamin et al 2014:6). Supportive supervision was considered a facilitator and a measure to improve health information system performance (Kumwenda et al 2017:309; Akhlaq et al 2016:1319).

## 5.5 EMERGING RELEVANT OUTLIERS

One comment was found particularly important to this study. The comment was raised in response to the question: "what are the opportunities for improving data management in the facility?"

A participant indicated the need for the facility managers to be trained at the level of health information officers at the district office. The participant highlighted a need to

have an in-depth understating of the data management process, target-setting, and the calculation of performance.

> *I wish that facility managers be trained intensively in data management. The training that I'm talking about is the one given to the health information system department and employees at our head office. I need to know how does the district set target for a couple year protection rate and how is the indicator calculated. (P8)*

## 5.6 SUMMARY

Chapter 5 presented the findings from the qualitative phase (phase two) of the study. The chapter discussed current practices in reproductive health data management, the use of reproductive health information for decision-making, views regarding the CYPR indicator, and an evaluation of the RHIS. Information was gathered from in-depth, individual interviews with facility managers, and analysed using thematic analysis, where themes, sub-themes, and categories were identified and discussed. Narratives were quoted, and findings were supported with literature.

Chapter 6 will present the integration, interpretations and discussions of the findings from the quantitative (phase one) and qualitative phase (phase two) of the study.

# CHAPTER 6
# INTEGRATION, INTERPRETATIONS AND DISCUSSIONS OF THE FINDINGS

## 6.1 INTRODUCTION

This chapter outlines the integration and discussion of the quantitative and qualitative findings of the study. The study employed an explanatory sequential mixed-method approach, which started with quantitative data collection and analysis, followed by qualitative data collection and analysis. Quantitative data were collected from HCPs using self-administered questionnaires, and qualitative data were collected from the facility managers using individual in-depth interviews. The findings from the two phases were presented separately in Chapter 4 (quantitative) and Chapter 5 (qualitative). The qualitative phase was informed by the results obtained from the quantitative phase, and the results are integrated and interpreted in this chapter. The theoretical framework applied in the study (PRISM framework) is used to inform the interpretation of the integrated results. Key findings from the quantitative and qualitative phases are discussed jointly, with the focus on new insights that emerged from both data sets.

## 6.2 THE PRISM FRAMEWORK

According to the PRISM framework, the RHIS consists of inputs, processes, outputs, outcomes, and impacts. The performance of the RHIS is measured by improved data quality and continuous use of information. The framework suggests that the performance of the RHIS (outputs) are influenced by RHIS processes, namely data collection, processing, analysis, display and feedback mechanisms. Meanwhile, the processes are influenced by the RHIS inputs, which include organisational, behavioural and technical factors. The outputs influence the outcome and the impact of the health care system (Mucee et al 2016:664; Boadu 2015:9). The study examined only the first three components of the framework because they directly affect data quality and information use.

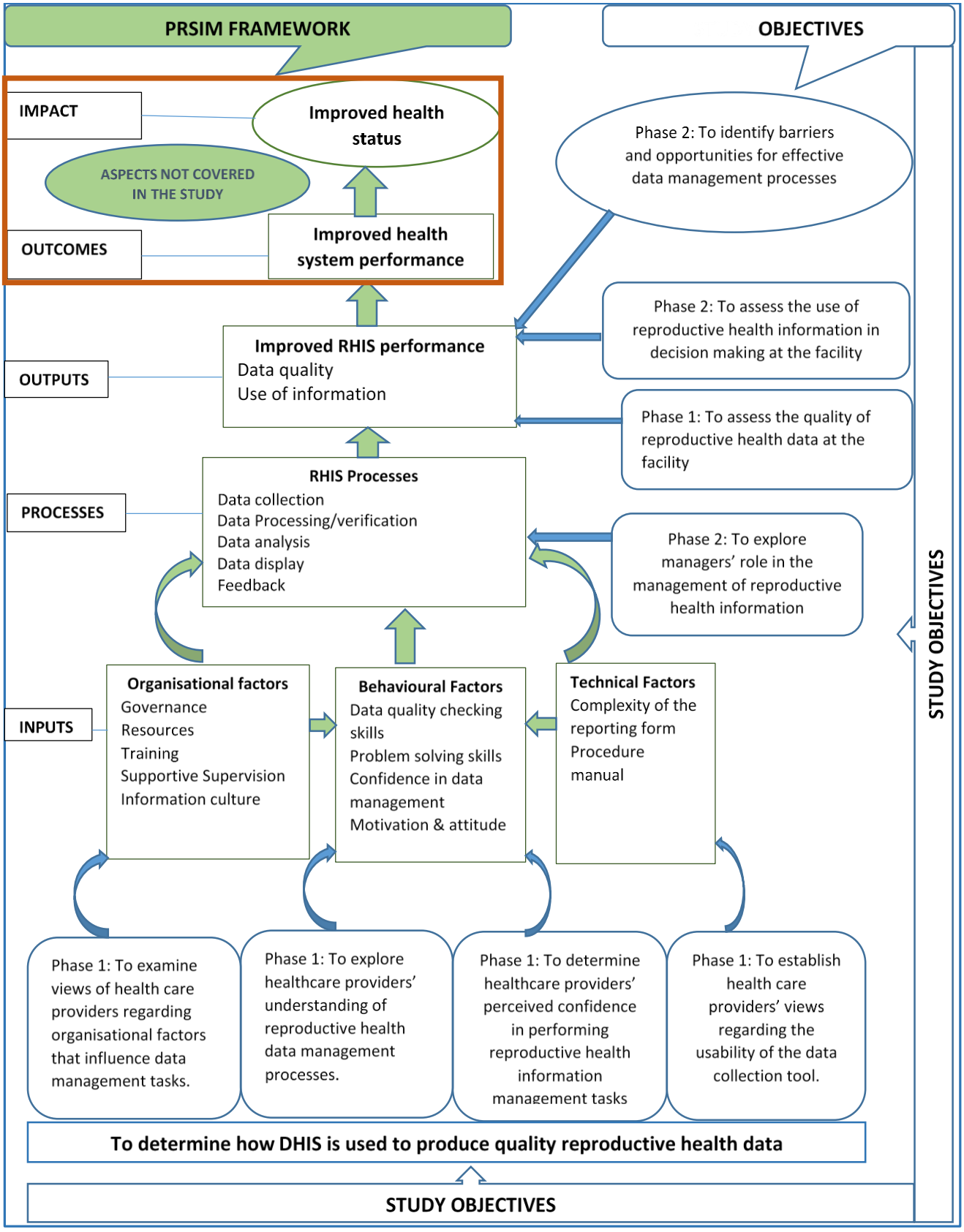


**Figure 6.1: The link between PRISM Framework and study objectives**

The outcome and impact were not examined in this study because they are usually assessed over an extended period (e.g. minimum of five years) (see Figure 6.1). The PRISM framework facilitated the identification of factors determining the quality of data and the use of information for decision-making.

### 6.2.1 RHIS inputs

The evaluation of RHIS inputs focused on routine information system determinants, including organisational, behavioural and technical factors (Mucee et al 2016:664; Teklegiorgis et al 2016:2; USAID & MEASURE Evaluation 2019a:9). The organisational factors related to training, available resources, and support for data management were determined in phase one of the study and explored in phase two, while discovering facility managers' role in managing reproductive health information. The behavioural factors, namely, HCPs' understanding of the reproductive health data management process and perceived confidence in conducting reproductive health data management, were also assessed in phase one. Phase one also established the technical factors affecting data management by ascertaining the data collection tool's usability. The usability of the tool was further explored in phase two.

### 6.2.2 RHIS processes

RHIS processes are considered the backbone of the RHIS's performance (Boadu 2015:24). By exploring facility managers' role in the management of reproductive health information, the study evaluated the reproductive health data management processes, which included data collection, processing (quality check), transmission, reporting, and display. The provision of feedback was assessed in both phases of the study.

### 6.2.3 RHIS output

The RHIS's output entails the system's performance, which is based on the quality of data and the use of information. Data quality is determined by assessing the dimensions of completeness, timeliness and accuracy (Teklegiorgis et al 2016:2).

Phase one of the study thus assessed the quality of reproductive health data based on dimensions of accuracy, timeliness and completeness.

According to Mucee et al (2016:661), the primary purpose of collecting and analysing data is to improve health programmes through an informed decision based on facts. However, the use of information in improving the effectiveness of health systems depends on the power of decisions made, based on evidence from the generated information. The use of reproductive health information and barriers and opportunities for effective data management processes were assessed in phase two of the study.

## 6.3 THE INTEGRATION PROCESS

Integration is described as a deliberate process whereby the researcher brings together the quantitative and qualitative findings in a study to create a holistic understanding of a phenomenon (Fetters & Molina-Azorin 2017:293; Gutterman et al 2015:554; Richards et al 2019:1). Furthermore, the integration of both quantitative and qualitative data minimises the weakness and maximises each strategy's strength (Creswell, Klassen, Plano Clark & Smith [Sa]:5).

Integration can occur at several stages in a mixed-method study, including at design level, method level, or interpretation level (Berman 2017:7; Creswell & Plano Clark 2018:234). In this study, the integration of findings took place at the interpretation level (see Figure 6.2). The integration addressed the mixed-method research question:

> *How do data management processes and managers' role provide an understanding of the performance of RHIS in managing reproductive health information?*

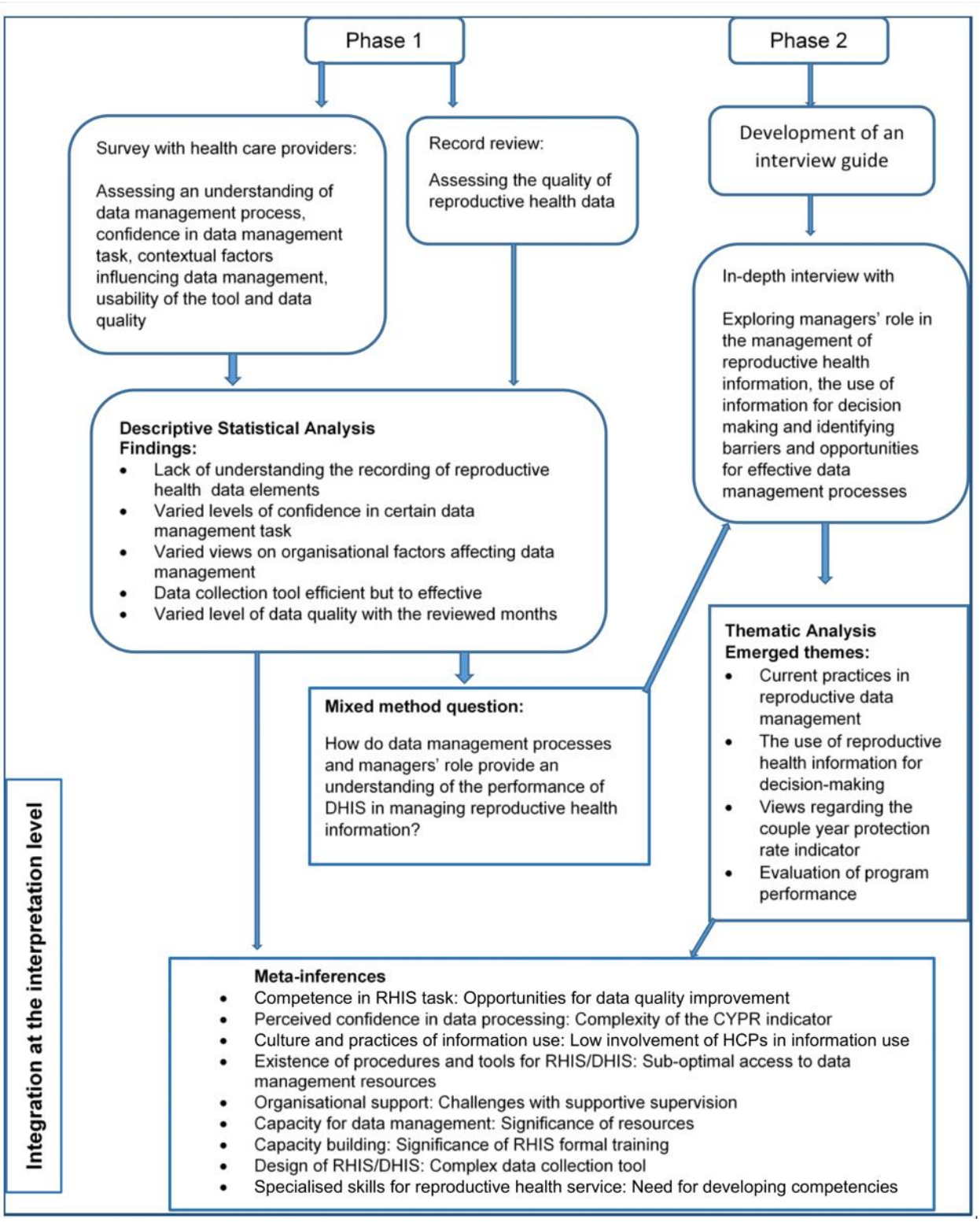


**Figure 6.2: Complementarity and completeness of quantitative and qualitative results to generate news findings**

Integration at the interpretation level occurs when the researcher connects the two data sets to demonstrate how they are more informative than one data set alone

(McCrudden & McTigue 2019:382). The integration at this stage was aimed at determining the complementarity and completeness of the findings to effectively evaluate the performance of the RHIS in generating quality reproductive health information. Complementarity means that the quantitative and qualitative data give different but nonconflicting results when compared (Fetters & Molina-Azorin 2017:302). Leavy (2017:181) asserts that complementarity involves comparing quantitative and qualitative findings to generate "complementarity insight" and produce a comprehensive understanding of the phenomenon under study. Moreover, completeness also refers to the need to gain a greater understanding of the phenomenon under study through a mixed method (Fiorini et al 2016:38).

A joint display was used to present the complementarity of the findings of the quantitative and qualitative results (Creswell & Plano Clark 2017:237). Through the joint display, the quantitative and qualitative findings were displayed side-by-side to support the researcher's process of drawing meta-inferences (McCrudden & McTigue 2019:338). It facilitated the detection of the differences and similarities among the information generated from different sources (Bazeley 2019:74).

In this study, the quantitative and qualitative findings were jointly interpreted to develop insight into the performance of the RHIS in managing reproductive health information in Tshwane. Consequently, new themes were developed and discussed. Table 6.1 reflects the assessed component, a summary of quantitative and qualitative findings, and the meta-inference (new themes) that emerged from the joint findings. Therefore, the mixed-method findings are the meta-inferences drawn by reviewing the matched quantitative and qualitative findings.

**Table 6.1: Joint display of quantitative and qualitative findings**

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | **Document review** | **Self-administered questionnaires** | **In-depth interviews** | |
| **Data quality** | **Accuracy**<br>In June, July, August, October and November 2017, over 84% of facilities generated accurate data on reproductive health elements. In September, less than 40% of facilities generated accurate data for SARC methods. | On average, 62.2% of HCPs who did not attend the RHIS training did not understand the recording of some data elements (oral pill cycles issued, Medroxyprogesterone injection, Norethisterone enanthate injections, IUCDs inserted and subdermal implants inserted).<br><br>However, 49.6% of trained HCPs did not understand the recording of the data elements either. | Managers were found to play a significant role in the production of accurate data. They claimed that the HCPs are subjected to regular in-service training and on-the-spot training on the indicators, SOP, policy, data collection tool, and data collection process. At the same time, new staff members are inducted on the same aspects.<br><br>However, they acknowledged the occurrence of incorrect data being collected by HCPs despite being in-serviced, attributed to a disregard for the importance of data and negative attitude towards data management. | Competence in RHIS tasks: Opportunities for data quality improvement |
| | | HCPs reported high confidence in their ability to correctly collect data (mean = 7.97). | Managers indicated that they ensure the correct collection of data by monitoring the data collection process, mainly the recording of data. | |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | **Document review** | **Self-administered questionnaires** | **In-depth interviews** | |
| | | HCPs reported high confidence in checking data accuracy (mean = 7.59). | Managers considered the reproductive health data to be generally accurate because it is verified weekly, and there is a dedicated staff member for the service. The person is considered proficient with data management for the programme. | |
| | **Timeliness**<br>From June to November 2017, 53.8%, 53.8%, 46.1%, 92.3%, 84.6% and 38.4% of facilities sent monthly reports on time to the sub-district or district office. | The majority (92%) of HCPs indicated that the facility's reproductive health data are sent to the district office every month. Some indicated that the data are sent to the sub-district and the district office on the third and on the seventh of every month, respectively. | Managers reported that they ensure correct data collation by monitoring the capturing of data onto the electronic record weekly, which facilitates the submission of reports to the sub-district and the district office on time. Meanwhile, a few managers from different facilities acknowledged the late submission of reports due to a shortage of and multitasking among data capturers. | |
| | **Completeness**<br>All (100%) facilities' reports were complete for the months assessed. | | The majority of participants believed that data were complete in terms of monthly reports. Some expressed uncertainty in terms of | |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | | the completeness of data at the collection point, attributed to the possibility of HCPs not recording some activities. | |
| **Data processing** | | HCPs reported lower confidence in plotting data by months or years (mean = 4.22), calculating the CYPR correctly (mean = 3.06), and the computing trend from bar charts (mean = 3.46). | Data analysis was mentioned as one of the aspects covered during the in-service training; however, some managers acknowledged a lack of understanding of how the target for the CYPR is calculated. They considered the target to be unrealistic and unattainable because of the consistently poor performance of the programme, despite their efforts. | Perceived confidence in data processing: Complexity of the CYPR indicator |
| **Use of information** | | HCPs reported medium confidence in using data to make various decisions and give feedback (mean = 6.05), and using data to identify gaps and setting targets (mean = 5.77). | Managers mentioned that they in-serviced HCPs on how to use data to plan and evaluate the services. Furthermore, they indicated that they use staff meetings to discuss action plans that would enable them to reach the set targets. The plans are reflected in the | Culture and practices of information use: Low involvement of HCPs in information use |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | | operational plan document. | |
| | | A minority of HCPs agreed that they received reproductive health service performance feedback on a monthly (32%) and quarterly basis (47%). | Participants explained that they hold weekly meetings to convey and discuss the performance feedback reports and data quality. These are recognised as permanent items on the agenda. The performance is reflected in graphs placed on notice boards for easy access to all staff members. | |
| | | The minority of HCPs agreed that:<br>• Staff is allowed to make decisions based on the feedback received (32%).<br>• Data are gathered to find the root cause of a problem (46%).<br>• Staff is involved in selecting interventions for a given problem (30%).<br>• Staff is involved in using data to evaluate the | Managers indicated that staff members are involved in decision-making and problem-solving through discussions held at monthly meetings. Active participation is encouraged because they acknowledged that staff members only take ownership of decisions that were agreed upon, although the responsibility for undertaking decisions and developing action plans is placed on the | |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | achievement of targets (32%). | champion of the programme.<br><br>They further alluded that the reproductive health information is used in monitoring the coverage of the target population, monitoring contraceptive utilisation rates, ensuring sufficient resources, budget and supply chain management, and in a comparison of pregnancy and contraceptive use.<br><br>They shared that the programme was not performing well and recognised impediments to effective use of the information to improve the performance as a lack of skilled providers, patients' preferences for SARCs, the use of private practitioners, and a shortage of contraceptive methods.<br><br>The following decisions were taken to increase the performance of the | |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | **Document review** | **Self-administered questionnaires** | **In-depth interviews** | |
| | | | reproductive health service:<br>• patients' education and community mobilisation on the availability of LARC; and<br>• reducing facility waiting times | |
| **Availability and accessibility of documents supporting data management** | DHMIS SOP was available at 12 (92.3%) facilities | A total of 64% and 60.4% of HCPs agreed that the DHMIS SOP and DHMIS policy is available and accessible, respectively. | Managers indicated that the DHMIS policy and SOP are available and accessible to all staff members. The documents are considered useful because they provide guidelines about the responsibilities of staff members, the data flow and the reporting lines from the facility to the national level. | Existence of procedures and tools for RHIS: suboptimal access to data management resources |
| | | A total of 62.2% of HCPs agreed that the latest facility operational plan indicating reproductive health plans and the target is available. | Managers mentioned that operational plans are available and utilised as platforms for reflecting quarterly and annual reproductive health performance targets and action plans. The targets are based on the previous year's | |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | **Document review** | **Self-administered questionnaires** | **In-depth interviews** | |
| | | | performance as a baseline. | |
| | | A total of 64.9% of HCPs agreed that the latest NIDS definitions for the current data elements and indicators are available. | Managers proclaimed that they provide up-to-date, relevant and specific content on HIM. Among others, the emphasis was on the data elements and indicators. | |
| | | A total 83.8% of HCPs agreed that the MDS tool is always available for data collection. | Managers recognised their responsibility in ensuring that the MDS is always available. However, they acknowledge the occurrences of shortages, which mainly take place during the transition of the data collection tools, resulting in staff members sharing tools or continuing to use old tools, consequently affecting the quality of data. | |
| **Supportive supervision by the health information officers** | | A relatively moderate number (31.5%) of HCPs agreed that the health information officers conduct supportive supervision visits quarterly.<br>A minority of HCPs agreed that the health | The majority of managers were dissatisfied with the level of support they received. The main issue seemed to be infrequent visitations by health information officers due to a shortage of staff and | Organisational support: Challenges with supportive supervision |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | information officers check data quality (25.2%), discuss performance (22.5%), discuss challenges (19.8%), and conduct on-the-spot training (18%) and send feedback reports (n=19). | problem-based support, leaving clinicians unsupported. At the same time, some were satisfied with the support and supervision they received from the health information officer.<br><br>They expressed a need for consistent, quarterly support visits by the health information officers to be able to identify challenges experienced at the facility level. Furthermore, the health information officers monitor the availability of quality improvement and action plans, and the implementation as well. | |
| **Barriers and opportunities for data management** | | A minority (18.9%; n=21) of HCPs agreed that staff are sufficient for data collection. | Managers revealed a shortage of human resources as a barrier to the data management process. They acknowledged that the shortage of HCPs causes work pressure, resulting in the postponement of data collection. | Capacity for data management: Significance of resources |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | | They suggested the recruitment of additional HCPs to facilitate correct data collection. | |
| | | A minority (21.6%; n=24) of HCPs agreed that data capturers are sufficient for data capturing, while 38.7% agreed computers are sufficient for data capturing. | Managers reported a shortage of data capturers and multitasking as a contributory factor to the late submission of reports.<br><br>They suggested the recruitment of data capturers to facilitate daily capturing and timeous submission of reports. | |
| | | The majority (86%; n=96) of HCPs were not trained on the RHIS. | All managers stated that the majority of staff are not trained on the RHIS. The challenge was the frequency of the training, which was either annually or less. Lack of formal training on the RHIS was identified as a barrier to correct data management due to individuals' difficulty in understanding the importance of data collection and its impact on facility performance. | Capacity building: Significance of RHIS formal training |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | | They recommended that data management training should form part of the nursing curriculum and to increase the frequency of RHIS training. Training is envisaged to improve the HCPs' understanding of data management processes, including the interpretation and use of information. | |
| | | More than 60% of HCPs found the MDS data collection tool as being easy to use, although they agreed that it is easy to enter data in the wrong field/block (64.9%), and to aggregate data incorrectly (62.2%) on the MDS tool. | The data collection tool was considered congested with many unnecessary data elements, resulting in data collection errors, especially among the newly employed staff.<br><br>Managers recommended that the usability of the tool be improved by the removal of data elements that are not relevant for the facilities, and to discontinue the use of a paper-based tool. | Design of RHIS: Complex data collection tool |
| | | Less than half (46%) of the HCPs were trained on reproductive health service. | Lack of competency in reproductive health service, specifically the competency in inserting | Specialised skills for reproductive health |

| | Quantitative Findings | | Qualitative | Meta-inferences |
|---|---|---|---|---|
| | Document review | Self-administered questionnaires | In-depth interviews | |
| | | | a LARC, like the IUCD, was reported to be the cause for the non-satisfactory performance of the reproductive health programme, and a barrier to the improvement of programme's performance.<br><br>Managers alluded to the need for reproductive health training, especially on the insertion of IUCDs. They anticipated that the training would improve the performance of the programme. | service: Need for developing competencies |

## 6.4 INTERPRETATION AND DISCUSSION OF THE INTEGRATED FINDINGS

The purpose of a health information system is to produce high-quality data/information that is fit for use at all levels of the health system. This study evaluated the performance of the RHIS in generating quality routine reproductive health information (couple year protection) in Tshwane district, with a particular focus on factors involved in data management processes and the use of information for decision-making. To realise the purpose of the study, the mixed-method study design was applied to determine how the RHIS is used to produce quality reproductive health data. This was done by examining the HCPs' views regarding the organisational factors influencing data management; their understanding of data management processes; determining their perceived confidence in performing reproductive HIM tasks; and establishing the

usability of the data collection tool. To further develop an understanding of the data management process, facility managers' role in managing reproductive health information was explored, and barriers and opportunities for effective data management were identified. Ultimately, the quality of reproductive health data and the use of reproductive health information for decision-making was assessed. The interpretation and discussion of meta-inferences drawn from the quantitative and qualitative findings follow.

### 6.4.1 Competence in RHIS tasks: Opportunities for data quality improvement

High-quality data are regarded as the foundation of health systems in terms of the generation of information required to plan, monitor health outcomes, policy-making, and evidence-based decision-making (Cheburet & Odhiambo-Otieno 2016a:202; O'Hagan et al 2017:368). Among other data quality dimensions, data accuracy, timeliness and completeness are the three attributes most measured (Alipour & Ahmadi 2017:315). For HCPs to generate data that meet these dimensions, they need to portray appropriate skills and competencies in generating quality data (Teklegiorgis et al 2016:7).

The results of the study revealed challenges regarding the use of the RHIS to collect quality data. The document review showed variations in data accuracy, with the lowest level found in September 2017. The accuracy level was low in data elements that measure the provision of SARCs, namely oral pill cycles (38%), Medroxyprogesterone injections (31%), and Norethisterone enanthate injections (31%). The data in the facilities' monthly reports were different from the data in the system at the district office concerning the same elements. The variation between the data at the facility and the district level reflects challenges in transmitting data from facilities to the district level, which might be attributed to the data collection and collation process at the facility level. Nicol et al (2016:66) posit that the first stage of accurate data transfer between registers and a monthly report occurs during the tallying and collation process at the facility level.

The majority of HCPs who did not attend the RHIS training, and some of those who attended the training, did not understand how to record most reproductive health

elements (see Section 4.2.2.3). The elements include the oral pill cycle issued, Medroxyprogesterone injection, Norethisterone enanthate injections, IUDCs inserted, and the subdermal implant inserted. For the data to be correct and accurate, the HCPs are required to record data in line with the NIDS' definitions (NDoH 2012a:11). A lack of understanding of data elements' meaning seemed to have resulted in the incorrect recording of data and poor data accuracy. Inaccurate data will not reflect the real situation occurring at the facilities, leading to a lack of trust in the data, and consequently, non-information use. Inaccurate data and non-utilisation of information reflect the suboptimal performance of the RHIS and indicate the need to develop the capacity for data management. Kasambara et al (2017:243) allude that misunderstandings of indicators among data collectors affect data quality negatively and point to a need for training and continuous updates.

Despite the challenges experienced in data collection and transmission, managers were found to play a significant role in ensuring facilities generate accurate data. It appears that managers conduct induction and in-service training for the HCPs on the meaning of indicators, the SOP content, and the data collection process. They further monitor the data collection process, thereby ensuring that data are recorded and correctly captured in the system.

However, the interventions seem insufficient, and managers acknowledged instances of incorrect data collection by HCPs. The action is attributed to HCPs negative attitudes towards data management and their disregard for the importance of data. It appears that HCPs perceived data management as not being their responsibility, but the manager's and data capturer's responsibility. This view results in a lack of interest, commitment, and negative attitude towards data management. Several other studies also reported that HCPs view health information systems as secondary to their patient care because they do not see how data impact patient care and how is it used for policy development (Kasambara et al 2017:243; Kumwenda et al 2017:308; Muhindo et al 2016:3). Furthermore, the process of transmitting, compiling, analysing, and presenting the data is usually viewed by HCPs as tedious, and by the time a report reaches the next level, the data are obsolete, and decisions are often made on any available information (Cheburet & Odhiambo-Otieno 2016b:135).

Although findings show that HCPs had negative attitudes towards data management, this could be suggestive of a lack of competencies to collect data accurately. Shaikh et al (2015:30) argue that the quality of data does not only depend on HCPs' perception and attitude, but also on bearing the necessary skills required for data management. Furthermore, Mucee et al (2016:669) and Nicol et al (2016:67) assert that a lack of competence in collecting and processing data at the facility level influences the quality of data and the use of routine health information. Therefore, it is essential for data collectors, capturers and managers at the facility level to understand the meaning of indicators in the RHIS and the importance of correct reporting to generate accurate data that can be used effectively (Ohiri et al 2016:328). Kabakama et al (2016:85) allude that the quality of data is dependent upon the RHIS's inputs, namely HCPs' technical skills and organisational factors (e.g. availability of training and staff); and the data management process (data collection, quality checks processing and transmission).

The findings revealed a gap between self-perceived and actual competence in the production of accurate data. The HCPs in this study showed high confidence in collecting data correctly and checking data accuracy, although the majority did not understand the recording of data elements. Hence, facility managers monitor the data collection process by ensuring that data on contraceptive services are recorded on the data collection tool. Similarly, in Kenya, Cheburet and Odhiambo-Otieno (2016b:136) found a gap between self-perceived capability and real competence in performing data management tasks.

Despite the variation in the accuracy of data and HCPs' lack of understanding of data recording, facility managers generally considered the quality of data to be good because it is verified before it is sent to the district office. They also reported some trust in data accuracy because it is predominantly generated by one person who tends to become more efficient over time, because they have been offering the service full-time. The result suggests that the data generated by the one HCP who is offering the service on a full-time basis might be accurate, while data generated by other HCPs might not be accurate. More specifically, the HCP is not the only person offering the reproductive health service, as indicated in Chapter 5. It was revealed during the interview that the patients who come for other services (e.g. chronic service) and also

need contraceptives are not referred to the mother-and-child service point but are managed comprehensively at one service point. Therefore, the HCPs at the other service points infrequently offer this service, hence they might not record the data correctly.

In addition to data accuracy, timeous reporting appeared to be a challenge in this study. Document reviews revealed variations concerning the timeliness of monthly reports. On average, 61.5% of monthly reports in this study were sent on time, which was higher than the 60% and 40% reported in Pakistan and Tanzania, respectively (Kabakama et al 2016:88; Shaikh et al 2015:29), but lower than the 75% reported in Kenya (Cheburet & Odhiambo-Otieno 2016b:135). Cases of late reporting were evident in this study, regardless of HCPs' knowledge of the reporting timelines. Many HCPs were aware that the data had to be sent to the sub-district and the district office by the third and the seventh of every month, respectively.

Although the HCPs were aware of the reporting timelines, it appeared that facility managers were the ones responsible for the transmission of data to the next level. Managers ensure that the data are captured on the electronic record weekly, which facilitates the submission of reports to the sub-district and the district office on time. However, this appeared to be a challenge since there is a shortage of data capturers. Those available are not only involved in data capturing but also in other administrative tasks, like archiving, because there is a shortage of administration staff. Therefore, data are not always captured on time, resulting in occurrences of late reporting. The finding contradicts data capturers' role as outlined in the DHMIS SOP; according to the SOP, data capturers should spend 100% of their work time capturing and collating data (NDoH 2012a:11).

The transmission of data from various areas to a designated point is vital in ensuring that data is available (Cheburet & Odhiambo-Otieno 2016b:135). Late submission of reports limit data availability and result in an incomplete representation of reproductive health performance at the district level. The delay between data aggregation and submission to when it is analysed and shared with decision-makers also hinders the use of reproductive health data for decision-making (Afe et al 2018:218). Kabakama et al (2016:90) assert that delays in the submission of monthly reports compromise

data availability at the next reporting level. Consequently, the data will not be meaningful in planning and designing essential reproductive health interventions.

These findings are consistent with those of Afe et al (2018:217) and Akhlaq et al (2016:1319), who found that the late reporting of health data is a barrier to the management of health information in middle-income countries. For the RHIS data to be meaningful, it has to be up to date and sent to the district health information managers on time for consolidation and vertical submission to the next level of reporting (Kabakama et al 2016:90). Moreover, the availability of reliable and high-quality data encourages data use, not only by service providers alone but also by policymakers (Afe et al 2018:216).

In terms of completeness, all monthly reports in this study were found to be complete. Data completeness was higher than the 70% and 62% found in Pakistan and Tanzania, respectively (Shaikh et al 2015:29; Kabakama et al 2016:88). However, some managers were not confident about data completeness at the point of service because of the possibilities of HCPs not recording some activities. Incomplete data means that only some data may be available, which may not represent the actual situation at the facilities and the population (Kabakama et al 2016:90). Consequently, incomplete data were reported to be a barrier to the use of information in family planning services in Nigeria (Afe et al 2017:24; Afe et al 2018:218).

Finally, this study's findings reflect data quality challenges, mainly in terms of data accuracy and timeliness. Poor-quality data portray an incorrect picture of the performance of the reproductive health programme. Endriyas et al (2019:5) affirm that the health system's performance cannot be adequately monitored when reporting is untimely and inaccurate. The lack of quality data results in challenges in using routine data to monitor and evaluate health interventions (Githinji, Oyando, Malinga, Ejersa, Soti, Rono et al 2017:2), subsequently having a negative impact on programme decisions, mainly where policies are based on the data (Ohiri et al 2017:328). The low quality of reproductive health data will thus have a negative impact on decision-making and policy development. Incorrect decisions will be made, and inappropriate actions may be taken.

### 6.4.2 Perceived confidence in data processing: Complexity of the CYPR indicator

People involved in data management require confidence and competence to contribute to a high-performing RHIS (USAID & MEASURE Evaluation 2017:24). It is presumed that if HCPs have high confidence in performing health management information system tasks, they would complete given tasks correctly (Dufera, Lamenew, Demissie & Guda 2018:234). For effective use of information at a local level, HCPs, as generators and users of information, need to be capable and confident in analysing and interpreting data. However, it was found that managers and HCPs lack knowledge, skills, and confidence in data analysis, interpretation and calculating targets for indicators (MEASURE Evaluation 2015).

It is evident from data that HCPs in this study were not confident in analysing and presenting reproductive health data. They reported low confidence calculating the CYPR correctly (mean = 3.06), plotting data by months or years (mean = 4.22), and computing trends from bar charts (mean = 3.46). Although managers claimed HCPs receive in-service training on data analysis, the finding reflects a gap in capacity building for data management. Mucee et al (2016:669) assert that the ability to analyse and interpret health information requires a skill that is usually not adequately addressed in health professionals' training. The authors further state that "capacity building in data analysis creates an environment that will enable the use of information for evidence-based decision-making" (Mucee et al 2016:669).

Some managers showed a lack of understanding of how the target for the CYPR is calculated; primarily in terms of the denominator used for the calculation. Managers were uncertain whether the catchment population or the facility headcount was used as a denominator when calculating the CYPR. This lack of understanding of the denominator for calculating the CYPR indicator reflects a lack of understanding of the NIDS definitions. Furthermore, managers were concerned about the accuracy of the CYPR on reflecting the actual health service activities. The performance of CYPR remained low regardless of the service improvement activities that were undertaken, like increasing the uptake of LARC methods. According to HISP ([Sa]:56), the indicator selected for the RHIS should be easy to calculate and sensitive to change – sensitivity

means that the indicator should immediately reflect changes taking place in a programme. In addition, an indicator is a technical determinant that influences the performance of the RHIS. For the programme to perform well, the indicator used to measure the programme's performance should be relevant (Teklegiorgis et al 2016:2). Although the CYPR appears to be relevant in measuring the reproductive health programme's performance, it seems to be complex and less sensitive to change; hence, it does not improve even though there is an improvement in service provision.

Furthermore, more uncertainty revolved around private facilities' reporting on the RHIS because patients seen by private practitioners form part of the public facility's catchment population. Hence, facility managers considered the target unrealistic and unattainable, influencing the constant underperformance of the CYPR based on the formula used for calculation. The denominator for CYPR is population-based and is derived from the census. The population-based indicators are considered challenging and complicated because people do not always seek medical assistance from the facilities in their residential area and attend facilities around their work area. At the same time, some prefer private practitioners (Maïga et al 2019:3).

The formula used to calculate the CYPR seemed complicated, and it will be challenging for an HCP at a facility level to analyse the indicator. The analysis involves adjusting each contraceptive method being dispensed according to a given factor to convert it into a contraceptive year, added together to constitute the numerator. For example, each Medroxyprogesterone injection administered is divided by four (Medroxyprogesterone injection/4) resulting in 0.25 contraceptive years, while each IUCD inserted is multiplied by four and a half (IUCD inserted x 4.5) resulting in 4.5 contraceptive years (Massyn et al 2020:66). The numerator is divided by the number of women aged 15 to 49 years in the population (denominator) and multiplied by 100 and expressed as a percentage (Massyn et al 2020:66).

MEASURE Evaluation ([Sa]) identified a shortcoming with the calculation of the CYPR for long-term methods. The CYPR credit the entire calculation of long-term methods (e.g. IUCD and voluntary sterilisation) to one calendar year; the year in which the method was accepted. However, the method offers protection over several years. As a result, it means that 35-year-old women who have inserted an IUCD in the current

year will contribute to the CYPR (as a numerator) for only one year. Yet they will be protected from pregnancy for ten years if they maintain the method for the entire duration. Considering the adjustment factor, the woman is protected for 4.5 years, although she is included in the calculation of the numerator for only one year. These same women will continue to form part of the denominator for calculating the CYPR for a few more years until they are older than 49 years. The denominator for CYPR is cumulative (including all 15 to 49-year-old women, even though some are already protected by long-term methods), while the numerator is not. Therefore, the CYPR does not appear to be an accurate measure for calculating the number of women protected against pregnancy.

Literature affirms that although the CYPR is widely used, it is considered an imperfect metric because it does not reflect the proportion of individuals who have accepted a method (HST 2016:99; MEASURE Evaluation [Sa]). Furthermore, MEASURE Evaluation ([Sa]) argues against the validity of the assumption underlying the choice of conversion factors. The use of conversion factors and census-based projections complicate the calculation of the CYPR. However, even though the CYPR is considered imperfect, it is the only routine health information indicator utilised by the RHIS in South Africa to measure reproductive health service in terms of contraceptive service coverage (Massyn et al 2020:65). In addition, the study's findings showed strong evidence with regards to the use of the RHIS in monitoring the performance of the CYPR (see Section 6.4.3).

It is evident from the findings that HCPs and facility managers are not involved or consulted when setting the target for the reproductive health programme. This would impact their level of understanding of how the indicator is calculated. USAID and MEASURE Evaluation (2015:78) also states that views and expectations of progress achievement from stakeholders, including the implementers, should be considered when setting targets. Furthermore, the target should be realistic and based on historical trends that show a pattern of change observed over time (USAID & MEASURE Evaluation 2015:78). It seems that the target for the CYPR is not based on historical trends, hence the managers in this study found it imposable to achieve. They alluded that their facilities and the district have not achieved the set CYPR targets for many years, yet the target is increased every year.

### 6.4.3 Culture and practices of information use: Low participation of clinicians in information use

A culture of information use refers to the dispositions, practices and behaviours of an organisation to encourage and support the use of evidence to inform decision-making (Arenth, Bennett, Bernadotte, Carnahan, Dube, Thompson & Walton 2017:8). Although the overall responsibility of information use lies with the managers, it is critical that staff members participate in the process. Their participation will increase their level of commitment in taking an active role in problem-solving and decision-making (Booyens & Bezuidenhout 2018:11). Lippeveld (2017:339) agrees that involving HCPs as stakeholders in problem-solving and decision-making can influence the use of information for service delivery improvements.

Mukred and Singh (2017:266) describe the information culture as shared assumptions, beliefs and ideas about obtaining, processing, sharing and using the information in decision-making and organisational management. Meanwhile, USAID and MEASURE Evaluation (2015:88) describe it as the capacity and control to promote values and beliefs within the organisation by collecting, analysing and using the information to achieve organisational goals. Among others, Mukred and Singh (2017:265) identified self-efficacy, perceived access, and perceived information sharing as information culture factors that affect the utilisation and performance of the RHIS (Mukred & Singh 2017:265).

The study's findings revealed some incongruence between the survey and interviews with facility managers in terms of the culture and practices of using reproductive health information. The survey showed moderate confidence among HCPs in using data to make various decisions, give feedback (mean = 6.05), and use data to identify gaps and set targets (mean = 5.77). Although it seems that managers provide in-service training on how to use the information for service planning and evaluation purposes, it is evident from the HCPs' confidence level that the in-service training is not sufficient for building confidence. Moreover, it appears that the discussions of action plans to meet the CYPR target do not enhance HCPs' confidence. The operational plans cited in the study also reflect the use of information for planning, but the HCPs' confidence levels might imply that they do not actively participate in developing the plans.

The results showed contradictions regarding information sharing at the facility level. The survey revealed that less than half of HCPs received reproductive health service performance feedback on a monthly (32%) and quarterly basis (47%), which is lower than the 87.4% (monthly and quarterly) found in Ethiopia, but higher than 16% (monthly) and 11% (quarterly) reported in Kanya (Abera et al 2016:103; Cheburet & Odhiambo-Otieno 2016b:138). However, the interviews with facility managers revealed that weekly meetings are held in the facilities to discuss performance feedback and data quality. These are discussed in every meeting and are recognised as permanent agenda items. The indicators' performance in terms of health service coverage is reflected in graphs, which are placed on the notice boards for easy access to all staff members. Cheburet and Odhiambo-Otieno (2016b:137) postulate that for the information to be shared and used successfully, it should be presented in simple formats like graphs to help the user interpret and understand critical issues.

The divergent views on information sharing could be a reflection of inadequate access to information. It is evident that not all HCPs are aware of the reproductive health programme's performance and the quality of data generated. Consequently, they may not be motivated to improve the reproductive health service's performance or the performance of the RHIS.

The RHIS aims to collect quality, routine health service data for reporting to the higher management level (district, provincial and national). The generated data should also be shared within the facility to permit HCPs and facility managers to make decisions about service delivery based on the locally available information (GP DoH et al 2016:21). However, most HCPs in developing countries simply report routine health data without receiving adequate feedback. Hence, HCPs at lower levels of the health care system have a minimum understanding of the benefits of information (Dagnew et al 2018:2). Moreover, a lack of feedback from managers was identified as a barrier to the use of family planning data at the facility level (Afe et al 2018:218).

Feedback is considered essential for quality improvement practices and is deemed a motivational factor for HCPs to perform well (Kumwenda et al 2017:308). HCPs who receive regular feedback on their monthly reports may receive relevant and constructive advice to utilise their data to improve their service delivery (Shiferaw et al

2017:7). Furthermore, feedback is regarded as a fundamental right of HCPs and other staff members, especially if they have submitted reports as required. The information needs to be interpreted and understood to enable the user to develop a potential action for their facility (HISP [Sa]:84). Moreover, timely feedback from managers on the reports generated promotes information use because it enables data producers and users to discuss and understand the data they are working with and how the data reflect the programme's performance (Afe et al 2018:218; Shiferaw et al 2017:7). To be able to use this information for decision-making, HCPs providers in this study required feedback on the quality of the data that were generated and the performance of the reproductive health programme. The feedback would allow them to interrogate the accuracy of the data in reflecting the reproductive health programme's performance, thereby improving the quality of data and reproductive health service delivery.

In addition to perceived 'less than optimal' feedback, the study revealed incongruence regarding the staff members' involvement in decision-making and problem-solving. Data show that not all HCPs are involved in decision-making and problem-solving. Less than half of HCPs agreed that they are allowed to make decisions based on the feedback they received (32%), data are gathered to find the root cause to problems (46%), they are involved in selecting interventions for a given problem (30%), and they are involved in using data to evaluate the achievement of targets (32%). On the contrary, facility managers recognised HCPs' involvement in decision-making and problem-solving through discussions held at monthly meetings. Although it seems that facility managers encouraged the active participation of all HCPs to encourage ownership of decisions taken, it is noted that the responsibility for decision-making and problem-solving lies with the champion for the programme. Therefore, it is apparent from the findings that not all HCPs are actively involved in using information for decision-making, but facility managers and the champion take responsibility. A champion is a HCP who is trained on the RHIS. This individual is afforded the data management responsibility and the responsibility of mentoring other staff members in the facility (USAID & Evaluation-MEASURE 2018b:15).

HCPs' low participation in using information for decision-making may result in a lack of motivation as it could create feelings of unworthiness and not being valued.

Furthermore, the low participation might cause a lack of ownership of decisions, resulting in a lack of commitment to implement them. Involving staff members in establishing better innovations for improving data quality was reported to be a motivating factor for staff to produce high-quality data (Cheburet & Odhiambo-Otieno 2016a:206).

The culture of information use for decision-making in this study appears to be suboptimal. A poor culture of information use and a top-down approach to target-setting were contributors to the poor use of information in health care facilities (Innocent et al 2016:11). Lippeveld (2017:339) posits that data users' decision-making and problem-solving behaviour influence the use of information for service delivery. Furthermore, when organisational management supports a culture of data-informed decision-making, information producers and users are better able to understand the value of information to the health system; information tends to be of higher quality; data are communicated and shared through the health system; and data are utilised for improving the service (Mucee et al 2016:670). The suboptimal culture of information use found in this study could contribute to a lack of understanding of the value of information in improving service delivery. Therefore, HCPs might not understand the importance of data quality and data sharing.

The results show that reproductive health information was used to make decisions on operational matters. The managers used the information generated from the RHIS to monitor the utilisation rate of contraceptive methods, monitor the coverage of the target population, ensure sufficient resources, budget and supply chain management, and compare pregnancy and contraceptive use. By monitoring the utilisation rate of contraceptive methods, facility managers could identify the most commonly used method. It was discovered that SARC methods were preferred over the LARC methods.

The results suggest that the utilisation of reproductive health information to monitor the coverage of the target population assisted facility managers in assessing the facility's performance concerning the CYPR target. As mentioned under Category 2.2.2, the CYPR is an indicator that is utilised to measure the percentage of women aged between 15 and 49 who are provided with contraceptive methods. In this

manner, managers were able to recognise that the facilities were not meeting the set target.

This result ties well with previous studies wherein routine health information was used in monitoring and evaluating the performance of the health programme (Nicol et al 2017:35; Ohiri et al 2016:326). In contrast, Deepa and Gopinath (2017:6) found that in India, reproductive and child health information was not used to identify problems or assess progress towards planned targets; instead, data were generated merely for reporting to the next level.

The study revealed the significance of information in managing resources at the facility. It is evident from the findings that the daily allocation and redirection of HCPs into different services was based on information generated from the RHIS. An increase in the utilisation of the service, specifically contraceptive service, prompted the need for more HCPs offering the service. Furthermore, managers utilised the reproductive health information (mainly the contraceptive utilisation rate) to compile a budget for contraceptive methods. The information appeared to be pertinent in managing the facility's supply chain process, thereby decreasing overstocking and consequent stock expirations. Similar to these findings, the use of information for forecasting medicinal stock requirements and ordering medications was reported in Botswana and Nigeria (Ohiri et al 2016:326; Seitio-Kgokgwe et al 2016:4). USAID and MEASURE Evaluation (2015:6) maintain that facilities' managers need data to calculate indicators that will give them a picture of the resources required for their service areas.

Additionally, data show that information from the RHIS can be utilised to assess the accessibility of the reproductive health service. Managers considered the use of information in comparing the incidences of unplanned pregnancy with contraceptive use as a basis for assessing the accessibility of services. They argued that the high incidences of unplanned pregnancies are related to non-utilisation of contraceptive methods, indicating a gap in the reproductive health programme. In support, Chola et al (2015:11) reported that many women in South Africa do not use contraceptives, resulting in unplanned pregnancies and abortions. The RHIS enabled facility managers in this study to monitor the utilisation of the service and the possible outcome of non-utilisation (e.g. unplanned pregnancy) based on the generated data.

The NDoH (2011:7) postulates that a well-functioning RHIS that collects, processes and uses information timeously will enhance the monitoring and evaluation of the health sector's performance.

The use of the PRISM framework to assess the use of reproductive health information in Tshwane seemed to suggest that the reproductive health programme was not performing well and needed to be improved. However, the findings reflected challenges in the use of information to improve performance. Staff members' competence, a shortage of contraceptive methods, use of private practitioners, and patients' preferences for SARCs appeared to be hindering the programme's improvement. Contrary to the study's findings, Afe et al (2018:217), in their study assessing factors influencing the use of RHI in family planning services, identified the shortage of staff, lack of funds, poor-quality data, and a lack of policy involvement as barriers to the use of RHI in family planning services.

Data show that the facilities lacked HCPs skilled in offering LARCs, especially in terms of the IUCD, and they were experiencing a shortage of injectable contraceptive methods. Since the study was conducted in an urban area, it seemed that employed patients' use of private practitioners affected the programme's performance. As indicated in Category 3.2.3, the patients utilising private practitioners form part of the facility catchment population and are included in the facilities' performance target. However, it appears that these patients are not recorded under the performance of the facility because they did not attend the facility. They are consequently impeding the facility's performance because they are not reported on the RHIS and are therefore considered an uncovered population.

Finally, the results suggest that offering SARCs as a preferred method for patients contributes very little to the facilities' performance. Admittedly, Massyn et al (2019:155) attest that LARCs, like IUCDs and implants, carry more weight on the performance of the CYPR as compared to oral and injectable contraceptives. Moreover, Ho and Wheeler (2018:174) postulate that patient preference may suggest challenges with the quality of the service in terms of increasing the uptake of other methods. Therefore, high-quality service is necessary to increase the utilisation of all available methods.

Despite the challenges, the results show that the reproductive health information generated from the RHIS was utilised to make decisions for service improvement. Two decisions were made; first, to improve patients' education and community mobilisation on the availability of LARCs. Second, to reduce facility waiting times. The first decision was made to increase the uptake of LARCs by increasing awareness about the availability and benefits thereof. Patients were educated about LARCs while waiting in the facility for other services and also in the community during community outreach sessions. The second decision was made to increase the utilisation of the contraceptive service. It is assumed that one of the reasons patients used private practitioners was to avoid spending a long period in the facility waiting for service. Therefore, the facility managers decided to make contraceptive service a 'fast queue'; meaning, all patients visiting the facilities only for contraceptives were offered a quick service at one designated consultation room. The practice suggests that health facilities were taking action-orientated decisions based on evidence from the RHIS. This is in line with Shiferaw et al's (2017:7) view that information must first be utilised at the place where it was produced.

Contrary to the study's findings, Nicol et al (2017:36) found that information generated from the RHIS was selectively used to monitor and report programme outputs and not used for decision-making and planning in South Africa. Similarly, in Sudan it was determined that facilities did not take any action-orientated decisions based on their actual performance against the set target. Decisions about the ordering of contraceptive methods were not based on evidence, mainly considering patients' preferred methods. Therefore, it was not likely that facilities were addressing the community's contraceptives needs (Moses et al 2019:17).

### 6.4.4 Existence of procedures and tools for RHIS: Suboptimal access to data management resources

The availability of procedures and tools for the RHIS reflect good governance to data management and commitment in achieving the highest quality data and use of information (Cheburet & Odhiambo-Otieno 2016a:204). The procedures and tools – including the data management policy, SOP, operational plan, standardised data collection tool, and definitions for indicators and data elements – provide guidelines

concerning the collection of quality data and promote a culture of information use. Furthermore, they assist in the identification of gaps and the development of action plans to address the gaps, thereby improving the coverage of the service (Belay et al 2013:23). Despite their availability, their implementation and enforcement appear to be a challenge in some countries (Arenth et al 2017:20).

The results of this study reflected that the facilities have HIM guidelines and policy in place. The DHMIS SOP was available in 92.3% of facilities. The SOP availability in the study was higher than the 34% and 36.4% reported in Malawi and Eastern Ethiopia, respectively (O'Hagan et al 2017:374; Teklegiorgis et al 2016:6). However, it appears from the results that HCPs' access to the documents is a challenge. Hence, just below two-thirds of the HCPs agreed that the DHMIS SOP (64%) and DHMIS policy (64%) are available and accessible. Facility managers disagreed and claimed the DHMIS SOP is fully accessible, and staff members are aware of the content because they are inducted on the SOP. The challenge with access to the documents might be due to the area in which they are stored. The SOP and the policy are mostly stored in the manager's office, and access to the office could have been challenging for some staff members. Hence, not everyone agreed that the documents were accessible.

The managers considered the SOP significant in providing guidelines about data management because it stipulates the responsibilities of staff members, the data flow, and the reporting lines from the facility to the national level. Admittedly, USAID and MEASURE Evaluation (2015:75) and (NDoH 2012a:1) affirm that the DHMIS SOP presents practical steps to be followed by HCPs and HIM personnel to ensure data are handled correctly and used to improve service delivery at the facility level, before submission to the next level. Furthermore, Scott and Gilson (2017:6) attest that an SOP guides data collection in the facilities and the generation of quality information to be used in programme reviews and planning.

Although the DHMIS SOP was available in most facilities, it appears that managers were not enforcing the implementation of the SOP at the facilities as reflected by some HCPs' lack of awareness of the guidelines' availability. The finding contradicts their role of ensuring the implementation of the SOPs as outlined in the DHMIS SOP (NDoH

2012a:1). This suggests that not all HCPs are aware of the importance and the content of the HIM guidelines/DHMIS SOP. They collect data without knowledge of their responsibilities in data management, as stated in the DHMIS SOP, which may have a negative impact on the data management practices at the facility. It results in incorrect data collection, compromising the quality of data and the use of information in the facilities. According to the DHMIS SOPs, HCPs should collect and collate data according to the procedure stipulated in the DHMIS SOP. They are responsible and accountable for ensuring high-quality data in patients' clinical records and their own routine data collection and collation tools (NDoH 2012a:10). The GP DoH (2016:90) emphasises that the availability of the DHMIS policy and DHMIS SOP at a facility is crucial because they are critical tools in guiding data management at the facilities.

In comparison to the SOP, the policy describes the HIM requirements and expectations at all health system levels – national, provincial, district, sub-district, and health facilities (NDoH 2011:9). The policy aims to standardise the implementation of the DHMIS across the country and to clarify the roles and responsibilities of each level of the health system (NDoH 2011:15). The availability of the policy and SOP reflects good governance and dedication across the country in achieving the highest standard of quality data as a basis for generating "information for policy-making, planning, monitoring health outcomes and evidence-based decision-making" (Cheburet & Odhiambo-Otieno 2016a:204). Furthermore, good governance at the public health facilities was found to be encouraging HCPs to use routine health information for evidence-based decision-making (Dagnew et al 2018:6).

However, a lack of policies and protocol guiding the actions and defining the responsibilities of different actors in data management was found to create inefficiencies, which have a negative impact on the overall HIS (Seitio-Kgokgwe et al 2015:12). Yourkavitch et al (2016:1168) posit that a lack of written protocols that ensure different aspects of data quality throughout the system, contribute to inconsistencies in reporting between the health system levels. Moreover, the lack of policies encouraging the use of data was a barrier for the use of reproductive health data (Afe et al 2018:218).

In addition to the HIM guideline (SOP and policy), the availability and the accessibility of the operational plan seemed to be a challenge in this study. However, managers believed that operational plans are available to all HCPs, yet only 62.2% of HCPs agreed that the latest facility operational plan indicating reproductive health plans and targets is available. The lack of knowledge about the availability of the operational plan by some HCPs could suggest that not all HCPs are involved in developing the plan. The finding supports the earlier discovery in Section 6.4.3.2, where it appeared that not all HCPs are involved in problem-solving and decision-making.

Facility managers considered the operational plan to be an essential decision-making tool because it reflects quarterly and annual reproductive health performance targets and action plans to achieve the targets. The targets are based on the previous year's performance as a baseline. The finding is supported by USAID and MEASURE Evaluation (2015:78) highlighting that the operational plan is utilised to guide yearly activities and ensure that the programme is on track to meet the set goals and objectives. The baseline values from past performance reflect trends that show patterns over time and should be utilised to set targets (USAID & MEASURE Evaluation 2015:78). Shuey, Bigdeli and Rajan (2016:1) state that an operational plan is a plan of activities to undertake in line with the overall national health plan, and is concrete enough for health care practitioners to know their specific responsibilities.

Notwithstanding the challenge with the HCPs' involvement in the development of the operational plan, the use of health information tools to improve performance in this study was better compared to a study conducted in Rwanda; it revealed that the baseline on the operational plan was not set using previous information from the health management information system (Innocent et al 2016:09).

Even though the NIDS definitions are in the official register (MDS tool) used for data collection in the facilities (NDoH 2012a:11), not all HCPs (64.9%) agreed that the latest NIDS definitions for the current data elements and indicators are available. However, managers proclaimed that they ensure HCPs have updated data element and indicator definitions. A possible explanation for this finding might be the lack of RHIS formal training, insufficient orientation to data management, and lack of HCPs' interest in data collection. However, the availability of NIDS definitions in this study was high

compared to the 43% and 58% reported in Malawi and Southern Ethiopia, respectively (O'Hagan et al 2017:374; Wude et al 2020:5). The availability of NIDS definitions is crucial because they are a critical tool in guiding data collection at the facilities (GP DoH et al 2016:90).

The finding implies that some HCPs are collecting data without knowing the meaning or criteria for reproductive health data elements. Consequently, data collected might not accurately reflect the programme's performance. NIDs definitions provide clear criteria for each data element and indicator. The definitions are essential for the standardisation of the health information system to ensure comparability of data among facilities, districts, provinces and countries (USAID & MEASURE Evaluation 2015:13).

Several studies discovered that HCPs with standard health indicators in their offices were more likely to generate high-quality data and use information as compared to those who did not (Abera et al 2016:107; Teklegiorgis et al 2016:6; Wude et al 2020:6). Dagnew et al (2018:8) also posit that the presence of the standard indicators improves utilisation of information for evidence-based decision-making.

Regarding the availability of the data collection tool (MDS tool), the results show that the tool is always available in most facilities; 83.8% of HCPs agreed that the MDS tool is always available. Correspondingly, the majority of facility managers consented that the tool is always available, although it appeared that some facilities experienced a shortage of the tool. The shortages seemed to have occurred mainly during transitions between data collection tools, possibly due to a delay in the procurement of new tools.

Similarly, a data quality assessment conducted in Gauteng found that 32% of facilities ran out of the data collection tool in July 2015, a period when there was a change of registers to new ones (GP DoH et al 2016:93). As a result, staff members were sharing tools, and some continued using old tools, consequently affecting the quality of data. The practice of using outdated tools due to shortages was also reported in Malawi (Yourkavitch et al 2016:1168).

### 6.4.5 Organisational support: challenges with supportive supervision

Supportive supervision is critical in strengthening knowledge and skills for data management. The focus of supervision is mainly on the conditions required for the effective functioning of the RHIS, specifically the implementation of SOPs. Best supervisory practice includes the availability and utilisation of standardised supervisory guidelines, a standardised checklist for supervision, having scheduled supervisory visits, and a good feedback mechanism (USAID & MEASURE Evaluation 2015:82). If well implemented, supportive supervision plays a vital role in identifying gaps and improving HCPs' performance in data management and quality of care (Shiferaw et al 2017:7)

The findings revealed inconsistencies regarding the supportive supervision received from the health information officer, which was deemed unsatisfactory for the effective management of reproductive health data. It appears that not all facilities are visited quarterly. Hence, only a few HCPs (31.5%) agreed that they received quarterly supervisory support from the health information officers. The proportion of HCPs who were supervised quarterly in this study is lower than the 48% reported in Kenya, and higher than 1.3% reported in Palestine (Cheburet & Odhiambo 2016a:205; Mimi 2015:149). The supervision process, which entails mainly activities conducted during supervision, seems not to be standardised as reflected by incongruities among HCPs and facility managers. The results show supervisory activities mainly focused on the checking of data quality (25.25), discussing performance (22.5%), discussing challenges, (19.8%) and on-the-spot training (18%). At the same time, only 17.1% of HCPs received feedback. The checking of data quality (25.2%), and discussion of performance (22.5%) during the supervisory visit is lower in this study than the 34% and 61% reported in Kenya, respectively. This study's level of feedback was also low compared to the 50% reported in Kenya (Karijo 2013:44).

The majority of facility managers also considered the level of support they received from health information officers unsatisfactory. The main challenges were insufficient visitation and problem-based support, leaving the HCPs unsupported. On the contrary, some managers were satisfied with the support because in their experience, the health

information officer gives performance feedback, conducts support visits, and is always available to assist.

The inconsistencies in the implementation of supportive supervision contradict the expectations of the DHMIS SOP. According to the SOP, health information officers are expected to conduct supportive supervisory visits quarterly and should perform the following tasks during the visits: check data quality, discuss performance, discuss challenges, and conduct on-the-spot training (NDoH 2012a:15). The inconsistencies in the implementation of the supportive supervision would imply that not all HCPs and facility managers are supported. Unsatisfactory supportive supervision might contribute to poor data quality and non-use of information for decision-making.

Inadequate supportive supervision and monitoring of HMIS activities in the field lead to a lack of verification at the point of data collection (Mucee et al 2016:669). At the same time, the absence of adequate supervision in an organisation creates data management issues and communication gaps among the data generators and the decision-makers at the higher level (Akhlaq et al 2016:1318). Furthermore, a lack of regular and consistent supportive supervision was considered to negatively affect the perceived importance of data and the quality of data, and ultimately the use of information (Cheburet & Odhiambo-Otieno 2016a:207; Mucee et al 2016:670).

The factors related to inadequate supervision are unknown, and were outside the scope of the study. However, it appeared from the results that the unsatisfactory supervision might be due to a shortage of health information officers, becoming one of the organisational constraints influencing the data quality and use of information (Mucee et al 2016:669). Hence, poor data quality was associated with a lack of supervisory activity by the middle and higher-level health managers in Haryana (Singh et al 2016:13).

Facility managers considered supportive supervisory visits important and expressed a need for consistent, quarterly support visits by the health information officers. The visits were deemed necessary in identifying data management challenges experienced at the facility level. Furthermore, the expansion of the scope of the visit to cover the monitoring and the implementation of the quality improvement plan was

deemed necessary for some managers. Similarly, in Ethiopia, the importance of supportive supervisory visits in identifying gaps in data management, improving HCPs' performance, and the programme's overall performance has been documented (Shiferaw et al 2017:7).

Supportive supervision was found to be critical in addressing data quality issues by assisting in tracking significant data variations in time to enable further investigation for quality purposes (Cheburet & Odhiambo-Otieno 2016a:203; Cheburet & Odhiambo-Otieno 2016b:135). Moreover, supportive supervision, accompanied by feedback, was found to be critical in strengthening data quality (Cheburet & Odhiambo 2016a:203). In Malawi and Ethiopia, good data quality and good routine health information utilisation were associated with regular supportive supervisory visits (O'Hagan et al 2017:377; Shiferaw et al 2017:6), consequently improving the overall performance of a health programme, particularly the quality of care (Shiferaw et al 2017:7). Therefore, for the RHIS to be used effectively for decision-making, HCPs and health managers should be supported in collecting, processing, and using information (Mucee et al 2016:670). The authors further state that competency in collecting and using health information requires not just knowledge and skills but also a supportive environment (Mucee et al 2016:662).

### 6.4.6 Capacity for data management: Significance of resources

Human and ICT resources play a vital role in data management. Facilities should have the adequate staff required to provide health service and data management (USAID & MEASURE Evaluation 2015:80). However, literature reported understaffing in the health facilities as contributing to work overload for the available staff, resulting in data management errors, consequently undermining the potential of the RHIS in generating quality information (Hochgesang, Zamudio-Haasb, Moranb, Nhampossac, Packeld, Lesliee, Richards et al 2017:328; Shaikh et al 2015:31). ICT resources such as computers play an essential role in generating, analysing and interpreting information. Thus, healthcare facilities require sufficient computers for capturing, analysing, and transmitting data and information from one management level to others. Furthermore, the availability of computers support the availability of data at all levels, thereby promoting decision-making at every level (USAID & MEASURE Evaluation 2015:83).

The results of this study indicate that the facilities lacked resource capacity for data management. Less than a quarter of HCPs felt there were sufficient staff for data collection (18.9%), data capturers to be sufficient for data capturing (21.6%), and computers to be sufficient for data capturing (38.7%). The finding is consistent with those of past studies, which reported a shortage of human resources for data management in Tanzania and Uganda (Somi et al 2017:88; Wandera et al 2018:22). Similarly, a study conducted in South Africa, Gauteng Province, revealed that some (6.9%) facilities in Gauteng did not have data capturers (GP DoH et al 2016:71). The availability of computers was also found to be a challenge in Botswana, where the majority (64%) of facilities did not have computers (Seitio-Kgokgwe et al 2016:5). Although it was reported that 99% of facilities in Gauteng had at least one computer, they seemed not to be sufficient. Insufficient computers for data capturing affect the timeliness of reporting negatively (GP DoH et al 2016:65).

Managers considered a shortage of human resources as barriers to the data management process. They believed that the available HCPs are overburdened with other responsibilities, specifically patient caregiving, and less priority is given to data management; data capturers are multitasking due to the shortage of other support staff, resulting in late submission of reports. Similar findings were reported in Malawi, where the shortage of human resources was found to cause extra work pressure for available staff, resulting in data collection and capturing errors (Kasambara et al 2017:243).

A shortage of human resources could negatively affect the programme's perceived performance, which is reflected in the recorded data and generated information. Overburdened staff members would either record data incorrectly or not record at all, thereby negatively affecting the completeness, timeliness, and accuracy of data, consequently producing poor-quality data that will not generate useful information (Wandera et al 2018:22). Literature affirms that the shortage of human resources is a significant problem affecting data quality and the extent to which the information is used in planning and decision-making (Akhlaq et al 2016:1321; Nicol et al 2016:67; Seitio-Kgokgwe et al 2016:9). Seitio-Kgokgwe et al (2016:9) also claim that a lack of resources indicates a lack of management advocacy and effective negotiation for HIM.

Although this study did not assess factors related to the use of reproductive health information, the availability of staff for the provision of service and data management in Nigeria was deemed to be a facilitator for using the RHIS in family planning service (Afe et al 2018:218). Hence, facility managers in this study suggested recruiting sufficient HCPs and data capturers to improve the quality of captured data.

### 6.4.7 Capacity building: Significance of RHIS formal training

The RHIS's performance in generating quality data and information is dependent on the competency of data generators and users. Therefore, training is significant in providing the core competencies required to complete the RHIS tasks and achieve programme goals (USAID & MEASURE Evaluation 2015:81). Chen et al (2019:14) affirm that training on the RHIS is necessary to impart information and provide instructions to help staff members acquire the knowledge and skills needed to improve their performance. However, capacity building, mainly training on the use of the RHIS to generate quality information, was a challenge that requires innovative strategies, such as collaborating with higher education institutions in offering short- and long-term HIS-related training (Seitio-Kgokgwe et al 2016:9).

The study found a gap in HCPs' capacity building on data management in the facilities. The survey results revealed that most HCPs were not trained on the RHIS, and most did not understand the recording of reproductive health data elements. The gap could also be related to the infrequency of training; some managers could not even recall when the last training was, while others thought it was a year ago. The lack of formal training on the RHIS was considered a barrier to correct data management because untrained HCPs could not understand the importance of data collection and its impact on facility performance.

This finding is consistent with reports from different regions in Ethiopia, stating that 87.9%, 53.2% and 61.7% of HCPs were not trained on HIM (Dagnew et al 2018:4, Shiferaw et al 2017:4; Yarinbab & Assefa 2018:9). In contrast, Teklegiorgis et al (2016:7) found that the majority of staff (75%) in health care units of Ethiopia were trained on HIM tasks and capable of performing these tasks.

In support of this study's findings, a lack of training was reported as a barrier to effective data management in low- and middle-income countries and reflected a lack of organisational support for data management from the district level (Akhlaq et al 2016:1318). Untrained HCPs tend to feel overburdened and unable to complete data management tasks efficiently, thereby negatively affecting data quality (Akhlaq et al 2016:1318; Teklegiorgis et al 2016:7). Seitio-Kgokgwe et al (2016:8) affirm that a lack of training in HIM for personnel at different levels of the health system can significantly impact the availability and quality of data extent to which information will be used for planning and decision-making purposes.

In this study, facility managers considered training necessary because it ensures adequate knowledge of data management and information use to monitor the programme's performance. Training is envisaged to improve the HCPs' understanding of data management processes, including the interpretation and use of information.

They recommended that data management training should form part of the nursing curriculum, and the frequency of RHIS training should be increased. Similarly, recent studies identified training as essential in ensuring staff's capacity in performing routine HIM tasks, especially in ensuring the accuracy and completeness of data (Nicol et al 2016:67; O'Hagan et al 2017:378). Continuous training was recognised as necessary in improving data management skills, creating awareness, confidence, motivation, and changes in personnel's attitudes towards the ownership of data and use for decision-making (Kebede et al 2020:8; Teklegiorgis et al 2016:7; USAID & MEASURE Evaluation 2018b:17). It is recommended that the training should be designed in a manner that will enable HCPs to understand and appreciate the role of information in their work (Seitio-Kgokgwe et al 2016:9). Trained staff were found to be capable of using routine health information; they can compile and analyse information generated from day-to-day activities (Shiferaw et al 2017:7).

### 6.4.8 Design of RHIS: Complex data collection tool

The RHIS data collection tool (MDS tool) is the core component of data collection in the health facilities. It is a 'tick register' with predetermined columns to assist HCPs in marking the data elements according to the service provided. The quality and the

usability of the collected data depend on the relevance, simplicity, and layout of the tools (USAID & MEASURE Evaluation 2015:24). Therefore, a complex and poorly designed tool may impair the accuracy of the data, so the format of the data collection tool should be simple and standardised (Chen & Yu 2019:5-12).

Data shows that the tool used to collect reproductive health data (MDS tool) is complex and not entirely effective in accurately collecting data. The majority of HCPs believed that it is easy to enter data in the wrong field/block (64.9%) and aggregate data incorrectly (62.2%) on the MDS tool. Facility managers considered the tool to be congested with many data elements, making it easy to record and aggregate data incorrectly, especially for newly employed staff. The congestion is attributed to the tool containing data elements that are not relevant to the facilities, mainly because they do not offer all services. Therefore, it requires more time and effort to record accurately due to the complex design.

The use of paper-based registers containing small columns of many data elements, especially where some services included in the tool were not offered in that facility, was not unique to this study but also documented in Benin and Kenya (Ahanhanzo et al 2014:6; Manya & Nielson 2016:120). Consequently, HCPs used other columns to record any other data relevant to them (Manya & Nielsen 2016:120). Contrary to these findings, the majority (93%) of HCPs in Palestine found the RHI data collection form to be user-friendly (Mimi 2015:140).

The complexity of the tool in this study could result in data collection errors, thereby compromising data quality. Mucee et al (2016:669) postulate that non-user-friendly data collection tools lead to inefficiency in producing the information needed in making decisions. The finding suggests that for facilities to collect data accurately, the data collection tool should be simplified. Managers believed that the tool's usability could be improved by removing the data elements that are not relevant to the facilities and discontinuing the use of a paper-based tool. Similarly, in Malawi, Yourkavitch et al (2016:1169) suggested reducing the amount of data being collected and the improvement in the design of the data collection tool as a measure for improving data quality. Ohiri et al (2016:328) recommend that the functionality of the RHIS could be strengthened by simplifying data collection tools and the process. Easy to use data

collection tools and processes are considered fundamental to the functional information system (NDoH 2011:22). Moreover, Abera et al (2016:107), in their study on the utilisation of health management information systems and associated factors in Ethiopia, recommend that HCPs are clearly shown the relevance of each column in the register contributing to programme improvement and resource allocation.

### 6.4.9 Specialised skills for reproductive health service: Need for developing competencies

Skilled HCPs are critical in reproductive health programmes to meet family planning supply needs. However, literature has identified a challenge in specialised skill for reproductive health services, mainly the provision of LARCs, like IUCDs. The lack of skilled staff is presumed to be a barrier to the provision of LARCs (Lemani et al 2018:43). Moreover, training and mentoring on specialised skills required for administering IUCDs are essential to increase the uptake of the method (Gueye, Wesson, Koumtingue, Stratton, Viadro, Talla, Dioh, Cisse, Sebikali & Daff 2016:S39; Ho & Wheeler 2018:175).

The results of this study revealed that facilities lack the skills and competencies required to offer comprehensive reproductive health services. In this study, less than half (46%) of the HCPs were trained on reproductive health services, lower than the 68% reported in Ethiopia (Tessema, Mahmood, Gomersall, Assefa, Zemedu, Kifle & Laurence 2017:13). Moreover, it was found that 79% and 80% of facilities in Bangladesh had trained providers for IUCDs and implant LARCs, respectively (Haider, Barkataki, Ahmed, Nahar & Rahman 2019:15). It appears that the lack of training affected HCPs' skills and competency in reproductive health service negatively. The most affected competency seems to be the insertion of LARCs, specifically IUCDs, leading to the poor performance of the reproductive health programme since many patients might be offered SARCs methods instead. As discussed in Section 6.4.3.2, the use of SARC methods (oral pills and injectable contraceptives), compared to LARCs, was considered by managers to be the main contributory factor for the non-satisfactory performance of the reproductive health programme. In support, literature confirms LARCs' importance in increasing reproductive health performance as compared to the oral SARCs (Massyn et al 2019:155; Lemani et al 2018:43).

On the contrary, HCPs in the Democratic Republic of Congo were found to be competent and confident to offer long-acting methods, specifically IUCDs. The competency was attributed to the increased quality of clinical coaching on family planning skills during supportive supervision (Ho & Wheeler 2018:174). Also, Lemani et al (2018:41) reported an increase on the use of LARCs in Malawi soon after HCPs' training on family planning, consequently increasing the performance of the CYPR (Lemani et al 2018:41). Although training is essential, competency-based training alone without clinical mentors was found not to be sufficient in ensuring provider competency (Ho & Wheeler 2018:174). The findings thus suggest an increase in the availability of reproductive health training and mentorship is required, especially on the insertion and the removal of IUCDs. It is also anticipated that training accompanied by mentorship would improve the overall performance of the reproductive health programme.

## 6.5 SUMMARY

The chapter discussed the meta-inference of the quantitative and qualitative results, which formed the study's final findings. The chapter also discussed the relevant literature supporting the findings. An overview of how the RHIS is used to manage reproductive health information at the facility level, and the gaps identified in the data management process, were also presented. Chapter 7 covers the development of strategies to improve the performance of the RHIS in managing reproductive health information.

# CHAPTER 7
# STRATEGIES FOR IMPROVING REPRODUCTIVE HEALTH DATA MANAGEMENT

## 7.1 INTRODUCTION

Chapter 6 discussed the integration, interpretations and discussions of the quantitative and qualitative findings. This chapter presents the strategies developed for improving reproductive health data management in Tshwane district, Gauteng Province. The chapter starts with the strategy development process, a summary of evidence from the integrated findings (phase one and phase two results), and the validation process before describing the strategies in detail.

## 7.2 DEVELOPMENT AND VALIDATION OF STRATEGIES

A strategy is a plan of action for achieving one or more goals and objectives (Loh, Long & Spurgeon, 2019:31; Nickols 2016:3). For this study, it meant the development of a plan to improve the performance of the RHIS in managing reproductive health data at the facility level. The strategies' development was informed by evidence from the integrated findings from phase one and phase two, and reviewed literature. Furthermore, the researcher sought the opinions of routine health information experts (see Annexure I) and the study supervisor as a validation mechanism for the strategies. Below is a diagrammatic presentation of the process followed in the development of strategies to improve reproductive health data management (see Figure 7.1).

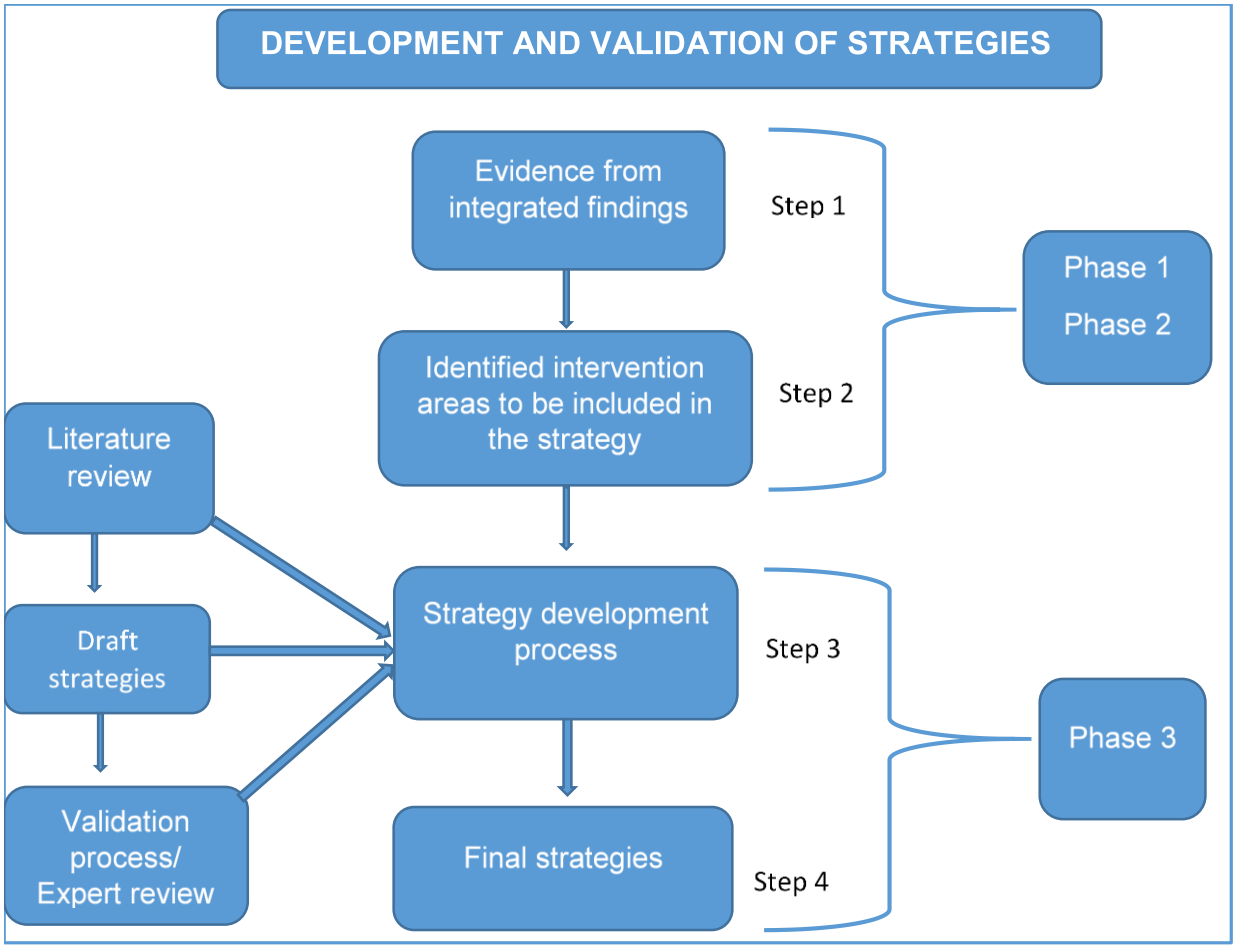


**Figure 7.1: Procedure for development and validation of the strategies**

### 7.2.1 Summary of evidence from integrated findings

The study identified a gap in HCPs' capacity building for data management. Few HCPs were trained on the RHIS, and training took place infrequently. The results of this study suggested that HCPs lacked competence in performing reproductive health data management tasks. The majority did not understand how to record reproductive health elements, they were unsure of the definitions for the reproductive data elements, and it appeared that the HCPs lacked interest, commitment, and had a negative attitude towards data management. Hence, there were challenges with the accuracy and the timeliness of data being generated. HCPs further lacked confidence in processing reproductive health data, specifically in terms of the analysis, presentation and interpretation of the CYPR indicator.

The CYPR indicator was found to be complex and difficult to calculate for the HCPs and facility managers, and they struggled with target-setting on this indicator. It seems that managers were not involved or consulted when setting the target for the CYPR.

Facilities had procedures and tools for data management, however, there was a challenge with access and utilisation of the procedures and tools. Organisational support in terms of supportive supervision was an additional challenge. Many facilities were not receiving the required supervisory visits from the health information officers, and lacked resource capacity for data management. HCPs, data capturers and computers were found to be insufficient. The data collection tool's design was also deemed complicated and congested, with many rows and columns containing irrelevant data elements. It was therefore easy to record and aggregate data incorrectly, consequently affecting the quality of data negatively.

The culture and practice of information use were low. The sharing of reproductive health information was also a challenge, and the majority of HCPs were not involved in the problem-solving decision-making process. Hence, they had moderate confidence in problem-solving and decision-making. Despite HCPs' lack of involvement, it appeared that the reproductive health information was used in making decisions on operational issues, and the management of the reproductive health service. However, there were challenges in using the information to improve the performance of the CYPR. Many HCPs lacked specialised skills for reproductive health services, specifically the insertion of IUCDs. Consequently, most patients were using oral and injectable contraceptives, which were found to be contributing less to the performance of the CYPR compared to IUCDs. Moreover, some patients preferred to use private practitioners for reproductive health services, and the reporting of those patients on the RHIS became a challenge, thus affecting the performance of the CYPR negatively.

### 7.2.2 Identified interventions areas to be included in the strategy

The identified areas of interventions to be included in the strategy emanated from the integrated study findings. The intervention areas centre around organisational, technical and behavioural aspects. Organisational interventions involve enabling an

environment that values information, through the provision of sufficient support in terms of data management resources, including human resources, material resources, and supportive supervision. The technical interventions consist of interventions that address technical barriers to the system, namely the complexity of the CYPR indicator and the complex design of the data collection tool. The behavioural interventions involve interventions that build individuals' core competencies and commitment to data management (Belay & Lippeveld 2013:14). Table 7.1 presents the identified intervention areas according to the PRISM framework (Belay & Lippeveld 2013:13) and the possible strategies required to improve reproductive health data management.

**Table 7.1: Identified interventions areas and possible strategies**

| Identified interventions areas | Possible strategies |
|---|---|
| Behavioural interventions | Building capacity for data management |
| Technical interventions | Simplify the CYPR indicator |
| Organisational interventions | Ensure sufficient resource capacity for data management |
| | Enhancing support for generating quality data |
| | Improving the culture of information use |
| | Improving the performance of CYPR indicator |
| | Establish measures to evaluate the performance of HIMS in managing health programme data |

### 7.2.3 The strategy development process

After the researcher gathered evidence from phase one and phase two of the study and the literature, draft strategies were developed and validated. The purpose of validating the strategies was to gain collective agreement from experts concerning the strategies' validity and appropriateness for the envisaged context. A two-round modified Delphi method was carried out to validate the strategies. As discussed in Chapter 3, round one of a modified Delphi involves developing strategies based on study findings and literature instead of an open-ended round of classical Delphi (Stewart et al 2017:4).

Round one of the Delphi process began with identifying HIM, and reproductive health and HRD (training) experts from the Department of Health Tshwane District, Gauteng Provincial Health, the National Health Department and NGOs supporting the

department of health. The researcher sought experts' consent to participate in the study through email (see Annexure J) and telephonic conversations. A virtual interactive workshop was held with 16 experts to present the key findings (integrated findings from phase one and two of the study) and to seek consensus on the proposed strategies. The researcher outlined the key areas that needed interventions, and participants shared their views after each key area was discussed. Their contributions included activities required for each strategic action. Those were consolidated into a questionnaire to seek final consensus. The meeting lasted for 75 minutes. The experts are described below according to their expertise, institutional affiliation, and response rate over the two rounds of Delphi (see Table 7.2).

**Table 7.2: Distribution of experts and response rate**

| No | Organisational affiliation | Frequency | Responses per round | |
|---|---|---|---|---|
| | | | Round 1 | Round 2 |
| 1 | National Health Office | 2 | 2 | 2 |
| 2 | Gauteng Provincial Health Office | 2 | 2 | 2 |
| 3 | Tshwane District Health Office | 4 | 4 | 2 |
| 4 | City of Tshwane Metropolitan Municipality | 5 | 5 | 4 |
| 5 | NGOs (HISP & WRHI) | 3 | 3 | 0 |
| **Total** | | **16** | **16** | **10** |

In round two, the researcher developed a questionnaire consisting of the proposed strategies, actions, activities, responsible units/person and time frame for each strategy (see Annexure K). Likert-scale questions were used for experts to rate their level of agreement and disagreement with each strategic actions and activities. The scoring for the Likert scale was based on a four-point scale, namely, 1-strongly agree, 2-agree, 3-disagree, and 4-strongly disagree. The strategies were circulated to the 16 experts through emails for consensus; however, only 10 experts responded. Table 7.3 reflects the demographic information for the experts who participated in round two.

**Table 7.3: Round 2 Expert evaluators' demographic information**

| No | Gender | Age range | Highest qualification | Organisational/ Department | Position | Years of experience in the position |
|---|---|---|---|---|---|---|
| 1 | Female | 50-59 | Bachelor's degree | Tshwane District Health Office | Data manager | 14 Years |
| 2 | Male | 50-59 | Master's degree | City of Tshwane Metropolitan Municipality | Dep. Director: Health Information management | 12 Years |
| 3 | Female | 40-49 | Bachelor's degree | City of Tshwane Metropolitan Municipality | Facility Manager | 9 Years |
| 4 | Female | 40-49 | Bachelor's degree | National Health Office | Assistant Director: Monitoring and Evaluation | 8 Years |
| 5 | Male | 40-49 | Master's degree | Gauteng Provincial of Health Office | Deputy Director: Health Information Management and monitoring and evaluation | 8 Years |
| 6 | Female | 50-59 | Bachelor's degree | City of Tshwane Metropolitan Municipality | Training coordinating officer | 2 Years |
| 7 | Male | 30-39 | Bachelor's degree | National Health Office | Data Manager | 5 Years |
| 8 | Male | 30-39 | Bachelor's degree | City of Tshwane Metropolitan Municipality | Functional Head: Mother, Child, Women's Health & Nutrition | 3 Years |
| 9 | Female | 40-49 | Bachelor's degree | Tshwane District Health Office | Programme Manager: Maternal, Women's Health and Genetics | 5 Years |
| 10 | Female | 50-59 | Diploma | Gauteng Provincial of Health Office | Data Manager | 10 Years |

### 7.2.4 Feedback from experts

Feedback from the 10 experts was considered when finalising the strategies for improving reproductive data management, as reflected in Table 7.4. The level of

consensus ranged from 60% to 100%. The percentages were calculated according to the frequency of rating on each strategic activity. The consensus was predefined as ≥ 70 of the sum of ‘strongly agree’ and ‘agree’ responses, as obtained from the experts’ rating, which is the total agreeable percentage. Experts agreed with all strategies, except for one strategic activity that obtained a consensus level of 60% (see Table 7.4). The activity was removed from the final strategies, which were compiled and sent to all experts via email. Literature affirms that, while there is no accepted standard for the target percentage agreement, a 70% or more on summative of agree and strongly agree is considered appropriate (Stewart et al 2017:4; Stewart et al 2017:4; Zelmer et al 2018:5). Hence, it was not necessary to conduct a third Delphi round.

Table 7.4 reflects the level of agreement obtained for each strategic action and activities. The level of agreement is reflected in percentages, abbreviated as percentage strongly agree (% SA), percentage agree (% A), percentage disagree (% D), percentage strongly disagree (% SD), and percentage total agreeable (% TA).

**Table 7.4: Feedback from experts**

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| 1. Building capacity in data management competencies | Improved competencies and confidence in performing HIM tasks | Design health information system educational programme | Review current HIM processes to identify the required competencies for data management | National, provincial and district HIM directorate | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Map the functions of each staff member related to HIM/RHIS | National, provincial and district HIM directorate | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Design a HIMS training curriculum to address the identified HIMS competencies | Human resource development (HRD) unit/training units and national, provincial and district HIM directorate | Annually | 40% | 60% | 0% | 0% | 100% |
| | | | The training curriculum for HCPs should cover essential aspects of data management | District HRD unit/training units | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | The training curriculum for the facility managers should cover the data management processes, including the use of | District HRD unit/training units | Annually | 70% | 30% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | information in managing the healthcare facility | | | | | | | |
| | | Ensure adequate resources for training | Conduct a personnel training needs assessment | Facility manager | Annually | 40% | 60% | 0% | 0% | 100% |
| | | | Establish a schedule and budget for HCPs' and facility managers' training on data management | District HRD unit/ training units | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Mobilise training resources within the organisation through the identification of appropriate training facilitators | District HRD unit/ training units | Annually | 70% | 30% | 0% | 0% | 100% |
| | | | Design a departmental training plan that will include a schedule for HIMS training | District HRD unit/ training units | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Design a departmental training programme to address health data | District HRD unit/ training units | Annually | 20% | 80% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | management competencies | | | | | | | |
| | | | Identify significant stakeholders for training collaboration | District HRD unit/ training units | Annually | 30% | 70% | 0% | 0% | 100% |
| | | | Collaborate with higher education institutions to ensure that they incorporate HIMS in the curriculum for HCPs' basic training | District HRD unit/ training units | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Conduct peer consultations with NGOs and higher education and training institutions (HETIs) on support for electronic learning platforms | District HRD unit/ training units | Annually | 10% | 80% | 10% | 0% | 90% |
| | | | Facility managers and HCPs should be trained on HIM/RHIS | District HRD unit/ training units and NGOs supporting the department | Quarterly | 50% | 50% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | Allow at least one HCP to attend each training session to provide a learning opportunity for all HCPs | Facility managers | Quarterly | 20% | 70% | 10% | 0% | 90% |
| | | | Develop a training database for monitoring the implementation of the training plan | District HRD unit/ training units | Annually | 40% | 60% | 0% | 0% | 100% |
| | | | Offer training updates whenever there are changes in the data management process | District HRD unit/ training units | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | Design an in-service training plan on data quality issues and use of information | Facility manager | Quarterly | 50% | 50% | 0% | 0% | 100% |
| | | Promote accountability and commitment to | Include data management on the performance appraisal system | District health management | Annually | 50% | 40% | 10% | 0% | 90% |
| | | | Design measures to enhance HCPs' | Facility manager | Annually | 30% | 60% | 10% | 0% | 90% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | data management | understanding of the purpose and criteria used for performance management | | | | | | | |
| | | | Conduct performance assessments according to the set criteria | Facility manager | Annually | 20% | 70% | 10% | 0% | 90% |
| | | | Develop a system of incentives for good performance (Improvements in data quality and use of information) | District health management | Annually | 30% | 60% | 10% | 0% | 90% |
| 2. Ensuring sufficient resource capacity for data management | Adequate resource capacity for data management | Ensure the availability of human resources for data management | Compile an actual workload and facility normative guide | Facility manager | Annually | 40% | 50% | 10% | 0% | 90% |
| | | | Review the existing health workforce against the normative guides | District health management | Annually | 30% | 70% | 0% | 0% | 100% |
| | | | Identify areas with lower or higher numbers of | District health management | Annually | 40% | 60% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | human resources per category | | | | | | | |
| | | | Use staffing norms to redistribute or recruit the required number of human resources per facility | District health management | Annually | 40% | 60% | 0% | 0% | 100% |
| | | | Develop strategies to promote staff retention and reduce staff turnover | District health management | Annually | 60% | 40% | 0% | 0% | 100% |
| | | Ensure the availability of technical resources for data management | Ensure that the budget for procuring data management resources is adequate | Provincial and district health management | Annually | 50% | 50% | 0% | 0% | 100% |
| | | | The budget should include the maintenance and service of the resources, e.g. software updates | Provincial and district health management | Annually | 60% | 40% | 0% | 0% | 100% |
| | | | Provide facilities with sufficient computers for timely capturing of data | Provincial and district health management | Annually | 60% | 40% | 0% | 0% | 100% |
| | | | Ensure uninterrupted internet coverage and | Provincial and district health management | Annually | 60% | 40% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | power supply for all facilities | | | | | | | |
| | | | Develop a contingency plan for the procurement and supply of new data collection tools during transitions and changes | Provincial and district health management | Annually | 50% | 40% | 0% | 10% | 90% |
| 3. Enhancing support for generating quality data | Improved data quality | Enhance data quality assurance practices | The DHIMIS SOP and policy should be a permanent agenda item on facility monthly meetings | Facility manager | Monthly | 50% | 40% | 10% | 0% | 90% |
| | | | Conduct data quality assessments every month before submitting reports to the next level | Facility manager and data champion | Monthly | 50% | 50% | 0% | 0% | 100% |
| | | | Conduct quarterly data quality review meetings to discuss data quality issues | District HIM directorate | Quarterly | 40% | 60% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | Develop a template for data quality improvement plans | District HIM directorate | Quarterly | 50% | 50% | 0% | 0% | 100% |
| | | | Develop a standardised procedure to monitor the implementation of the data quality improvement plan | District HIM directorate | Quarterly | 50% | 50% | 0% | 0% | 100% |
| | | | Conduct data quality audits on an annual basis | Provincial and district HIM directorate | Annually | 70% | 30% | 0% | 0% | 100% |
| | | Improve supportive supervision | Develop the SOP for data management and supportive supervision | Provincial and district HIM directorate | Once and reviewed every two years | 60% | 40% | 0% | 0% | 100% |
| | | | Develop a schedule for quarterly health information supportive supervisory visits for each facility | District HIM directorate | Annually | 70% | 30% | 0% | 0% | 100% |
| | | | Conduct supportive supervisory visits using the standardised checklist | District HIM directorate | Quarterly | 60% | 40% | 0% | 0% | 100% |
| | | | Supportive visits should focus on assessing the | District HIM directorate | Quarterly | 80% | 20% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | quality of data (completeness, timeliness, accuracy) | | | | | | | |
| | | | Findings from supportive supervisory visits should be reviewed and acted on to correct insufficiencies | District HIM directorate | Quarterly | 60% | 40% | 0% | 0% | 100% |
| | | | Standardised supervision reports should be completed to track results and monitor trends | District HIM directorate | Quarterly | 50% | 50% | 0% | 0% | 100% |
| | | | The report should be sent to the facilities to provide feedback on the outcome of the visit | District HIM directorate | Quarterly | 60% | 40% | 0% | 0% | 100% |
| | | | A report on the number of visits conducted should be sent to the next reporting level (higher authority) to ensure compliance | District HIM directorate | Quarterly | 40% | 50% | 0% | 10% | 90% |
| | | | Improve the design of the data collection tool | Provincial and district HIM directorate | Every two years | 40% | 40% | 20% | 0% | 80% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | Improve the data collection process | (primary health care/MDS tool) by reducing the number of data elements on the tool | | | | | | | |
| | | | Implement web-based data collection at the point of service | National, provincial and district HIM directorate | Immediately | 20% | 80% | 0% | 0% | 100% |
| 4. Improving the culture of information use | Improved culture of information use | Improve data generators' and data users' participation in decision-making | Involve facility managers in programme planning, when setting the target for the indicators (e.g. CYPR) | District HIM directorate, Monitoring and evaluation and health programmes | Annually | 60% | 30% | 10% | 0% | 90% |
| | | | Develop communication measures on the quality and performance of reproductive health data | District HIM directorate and facility managers | Monthly | 60% | 40% | 0% | 0% | 100% |
| | | | Develop measures to improve access to information | District HIM directorate and facility managers | Quarterly | 50% | 50% | 0% | 0% | 100% |
| | | | Involve the HCPs when developing and implementing the operational plan | Facility managers | Annually | 30% | 70% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | Create a plan for implementing a participatory management approach | Facility managers | Daily | 30% | 70% | 0% | 0% | 100% |
| | | | Develop standardised plans for using weekly and monthly meetings as a platform to create an information use culture | Facility managers | Weekly | 30% | 70% | 0% | 0% | 100% |
| | | | Modify the composition of the performance review team to include data generators/HCPs and data capturers | District HIM directorate, monitoring and evaluation, health programme managers and facility managers | Quarterly | 50% | 40% | 10% | 0% | 90% |
| | | Improve the use of information at the facility level | Develop plans for the use of information to review the CYPR performance | Facility managers | Monthly | 40% | 60% | 0% | 0% | 100% |
| | | | • to compare the performance of the indicator among facilities in the district | Facility managers | Monthly | 40% | 60% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | • to seek and share best practices for improving service delivery to patients | Facility managers | Monthly | 30% | 70% | 0% | 0% | 100% |
| | | | • to inform essential management practices | Facility managers | Monthly | 20% | 80% | 0% | 0% | 100% |
| 5. Simplifying the CYPR indicator | Simple and straightforward CYPR indicator | Review the formula used for calculating the CYPR | Review the use of conversion factors when calculating the CYPR so that it reflects actual programme performance | The National Department of Health | Immediately | 10% | 60% | 20% | 10% | 70% |
| | | | Review the formula used to calculate the CYPR indicator to make it simple | The National Department of Health | Immediately | 40% | 20% | 20% | 20% | 60% |
| 6 Improving the performance of CYPR indicator | Improved performance of CYPR indicator | Improve skills for reproductive health service provision | Conduct a personnel training needs assessment for methods with low performance | Facility manager | Annually, then review quarterly | 40% | 60% | 0% | 0% | 100% |
| | | | Establish a budget for the training of HCPs and facility managers on LARCs | District HRD unit/ training units | Annually | 40% | 50% | 10% | 0% | 90% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | Establish a schedule for the training of HCPs and facility managers on LARCs | District HRD unit/ training units | Annually | 40% | 50% | 10% | 0% | 90% |
| | | | Identify training facilitators with sufficient knowledge and skills on the insertion and removal of LARC methods | District HRD unit/ training units | Annually | 40% | 60% | 0% | 0% | 100% |
| | | | Identify significant stakeholders for training collaboration | District HRD unit/ training units | Annually | 30% | 70% | 0% | 0% | 100% |
| | | | Provide reproductive health training to HCPs, mainly on the insertion and removal of LARCs | District HRD unit/ training units | Quarterly | 30% | 70% | 0% | 0% | 100% |
| | | | Provide support and mentoring post-training to enhance HCPs' competence and confidence in the insertion and removal of LARCs | District HRD unit/ training units and reproductive health programme managers | Quarterly | 10% | 90% | 0% | 0% | 100% |

| Strategy | Expected outcome | Actions | Activities | Responsible unit/person | Time frame | Level of agreement | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % SA | % A | % D | % SD | % TA |
| | | | Develop a training database to document all training | District HRD unit/ training units | Annually | 20% | 80% | 0% | 0% | 100% |
| | | | Use data-driven approaches to monitor the effectiveness of training | District HRD unit/ training units | Annually | 20% | 80% | 0% | 0% | 100% |
| | | | Provide training on updates in the provision of LARCs | District HRD unit/ training units | When necessary | 40% | 60% | 0% | 0% | 100% |
| | | Improve the accuracy of CYPR | Mandate the reporting of contraceptive service by all private practitioners to the district offices | NDoH HIM directorate | Immediately and monitor monthly | 30% | 70% | 0% | 0% | 100% |
| 7. Establishing measures to evaluate the performance of HIM/RHIS in managing health programme data | Evaluate the performance of HIM/RHIS in managing health programme data | Design HIM evaluation approaches | Develop a plan to evaluate the quality of data generated | District monitoring and evaluation directorate | Annually | 60% | 40% | 0% | 0% | 100% |
| | | | Conduct an evaluation of information use using a standardised tool | District monitoring and evaluation directorate | Annually | 60% | 40% | 0% | 0% | 100% |

## 7.3 DESCRIPTION OF FINAL STRATEGIES

Strategies are the directional action decisions required to achieve organisational goals (Mainardes, Ferreira & Raposo 2014:46). For this study, it meant developing an action plan to improve the reproductive health data management process at Tshwane district health facilities. The ultimate goal is to facilitate the generation of high-quality reproductive health information that is continuously used in decision-making. The strategies described in this section consist of six main components: (1) scientific evidence for the strategies, (2) the rationale for the strategies, (3) the aim of the strategies, (4) the scope of the strategies, (5) the key results areas, and (6) the strategies.

### 7.3.1 Scientific evidence for the strategies

The current strategies are based on the evidence derived from the PRISM framework's application to evaluate the performance of the RHIS in managing reproductive health information. The PRISM framework facilitated the evaluation of RHIS performance and helped identify factors that affected the system's performance. In this manner, necessary interventions are identified and implemented to improve the system's performance; in this case, the quality of data and use of information for decision-making. Therefore, the PRISM framework "creates opportunities for improvement by identifying the strengths and weaknesses of the health information system" (Belay & Lippeveld 2013:12).

### 7.3.2 Rationale for the strategies

The rationale for developing the strategies was to devise remedial actions to address the identified gaps in the performance of the RHIS in managing reproductive health data. The gaps were mainly related to data management competencies, resource capacity for data management, support for data management, and the culture of information use. The researcher believes that strategies would lead to better results by improving the performance of the RHIS in managing reproductive health data (production of good quality data and improving the use of information).

### 7.3.3 Aim of the strategies

The overall aim of these strategies is to improve the RHIS's performance in managing routine reproductive health data by improving the elements influencing data management at the health care facilities.

### 7.3.4 Scope of the strategies

The proposed strategies are to be applied in the primary health care facilities, community health centres, mobile clinics, district hospitals, and the district health offices in Tshwane. Although the strategies are primarily designed for the Tshwane district, they are also applicable to other districts in Gauteng Province and other provinces with a similar context.

### 7.3.5 Key Results Areas (KRAs)

Two key results areas (KRAs) and seven strategies were formulated. Table 7.5 provides a list of KRAs, the corresponding strategies, and the expected outcome. Each KRA is described along with the strategy, strategic action, activities, responsible person or unit, and time frames for the activities.

**Table 7.5: List of KRAs and the corresponding strategic objectives**

| KRAs | | Strategies | | Expected outcome |
|---|---|---|---|---|
| 1 | Generating accurate, complete and timely reproductive health data | 1 | Build capacity in data management competencies | Improved competencies and confidence in performing HIM tasks |
| | | 2 | Ensure sufficient resource capacity for data management | Adequate resource capacity for data management |
| | | 3 | Enhance support for quality data generation | Improved data quality |
| | | 4 | Simplify the CYPR indicator | Simple and straightforward CYPR indicator |
| 2 | Using reproductive health information in decision-making | 5 | Improve the culture of information use | Improved culture of information use |
| | | 6 | Improve the performance of the CYPR indicator | Improved performance of CYPR indicator |

| KRAs | | Strategies | | Expected outcome |
|---|---|---|---|---|
| | | 7 | Establish measures to evaluate the performance of HIMS in managing health program data | Evaluate the performance of HIMS in managing health program data |

#### 7.3.5.1 KRA 1: Generating accurate, complete and timely reproductive health data

The goal of KRA one is to improve the quality of reproductive health data by ensuring HCPs are capacitated, supported and motivated to generate accurate, complete, timely and consistent data. This KRA can be achieved through the implementation of the following strategies:

##### 7.3.5.1.1 Strategy No 1: Build capacity in data management competencies

The study discovered that data management training, specifically RHIS training, is significant in capacitating HCPs and facility managers on data management. Capacity building takes place through educating and training staff members across all levels to enable effective execution of assigned responsibilities (Adaletey 2015:20). The following actions and activities were deemed necessary to meet the desired outcome, namely improved competencies and confidence in performing HIM tasks.

- *Strategic action no 1.1: Design a health information system educational programme*

As discussed in Chapter 5, in addition to the induction, orientation and in-service training provided by the facility managers, formal training of health care professionals was identified as a necessity for improving reproductive health data management. Training entails imparting information and providing instructions to help trainees attain a required level of knowledge and skill to improve their performance (Chen et al 2019:14). The provision of training is regarded as a useful strategy for improving data collectors' capabilities and competencies in routine data management (Adaletey 2015:23; Chen et al 2019:13).

The researcher acknowledges that training for HCPs cannot happen haphazardly but requires planning and monitoring processes. The first step in developing capacity for the management of reproductive health information is for the health information directorate at

all levels of care to review current HIM processes and identify the competencies required for data management. The review of processes should start with data collection, collation, processing (including verification), transmission, analysis, presenting and using the information generated. Each staff member's role and functions related to data management should be mapped, and required competencies should be identified. The HRD unit, together with the HIM managers at the national, provincial and district level, should collectively design an HIM training curriculum to address the identified HIM competencies. The training curriculum for HCPs should include the following data management competencies:

- Importance of data in the health care system
- Data management process
  - Data collection/the recording of data on the primary health care data collection tool
  - The data verification process
  - Data collation
  - Data quality check
  - Data analysis, including the calculation of the CYPR indicator
  - Presentation and interpretation of information
  - Communicating data for decision-making
  - Use of information for decision-making
- Importance of NIDS definitions
- The use of web-based DHIS (DHIS2) to manage data at the facility level

The training curriculum for the facility managers should include the following data management competencies:

- Techniques used for situational analysis
- Identify the health care needs of communities
- Conduct a strength, weakness, opportunities and threat (SWOT) analysis for their facilities
- Identify gaps and possible solutions to problems
- Develop operational plans
- Data quality control measures
- Determinants of data quality and information use
- Data analysis, presentation and interpretation of information

- Various approaches for communicating data
- Using available information to set of short- and long-term targets for programme indicators
- Promote the culture of information use at the facility level
- The use of web-based DHIS (DHIS2) to manage data at the facility level

- *Strategic action no 1.2: Ensure adequate resources for training*

To ensure adequate training resources, the facility managers should conduct a training needs assessment at the facility level to identify HCPs' training needs. The facility manager should check if HCPs have the knowledge and skills required to perform the facility-level data management responsibilities stipulated in the DHMIS SOP. Booyens and Bezuidenhout (2018:259) affirm that a training needs assessment involves reviewing personnel job specifications to identify activities and skills required to perform job-related tasks, consequently determining which personnel need training and those who do not. The assessment outcome should be sent to the HRD unit, which should establish a budget for training implementation. The unit should mobilise resources for training within the organisation by identifying training facilitators with sufficient knowledge and skills on data management. The training programme's success depends on the knowledge, skills, and characteristics of the facilitator/trainer (Booyens & Bezuidenhout 2018:259).

Furthermore, the HRD should develop a departmental training plan that includes a schedule for HIMS training. A training programme that will effectively address the required competencies for HIM tasks should follow the schedule. The programme should cover the essential aspects of data management mentioned earlier, including those stipulated in the DHMIS policy, DHMIS SOP, and acknowledge the importance of data in the health care system (O'Hagan et al 2017:378; Somi et al 2017:88). Most importantly, the training should address the recording of reproductive health data by ensuring that the HCPs understand the meaning of the reproductive health data elements and indicators.

A training collaboration partnership should be developed with higher education institutions and NGOs to support the department of health in training staff members; especially if there is a lack of training resources (facilitators and money). O'Hagan et al (2017:378) posit that partnerships with universities and statistical institutes to train students and staff members

are required to build capacity for data quality and data use. The strategy also suggests a collaboration between the departmental HRD and higher education institutions to ensure they incorporate HIMS in the curriculum for HCPs' basic training (diplomas and degrees). This might develop HCPs' data management competencies before work placement. USAID and MEASURE Evaluation (2015:81) maintain that training institutions like universities need to collaborate with RHIS capacity-building partners to develop and include RHIS modules in their curriculum. Peer consultations with NGOs and HETIs on the provision of support for electronic learning platforms for continuous training are also recommended.

The HRD unit, in collaboration with partners (higher education institutions & NGOs), should conduct at least one reproductive health data management training session quarterly. The facility managers should allow at least one HCP to attend each training session to provide a learning opportunity for all HCP who need the training. The sequence of sending staff for training should be communicated and agreed upon among the HCPs and facility managers to avoid tension and conflict among HCPs and the facility manager. The training should be mandated by management instead of voluntary, and all data collectors should have an opportunity to attend training (Chen et al 2019:14).

The HRD should annually develop a training database to monitor the effectiveness of the training plan by facilitating the analysis of training data (USAID & MEASURE Evaluation 2015:81). The database should be updated quarterly to facilitate active monitoring of the implementation of the training programme. It should include the percentage of HCPs trained every quarter per facility. The database will also enable the facility manager to have a current view of the progress made towards the fulfilment of HCPs' training needs. Furthermore, the HRD unit should offer training updates to capacitate staff members with current knowledge and skills. These updates should be implemented whenever there are changes in the data management process, such as the implementation of a new data collection tool and a revision of the national indicator set. To reinforce the application of data management skills, facility managers should design an in-service training plan on data quality issues, use of information, and implement it at their own facilities. In-service training should also be conducted quarterly.

It is envisaged that the training would improve HCPs and facility managers' competencies and confidence in performing HIM tasks. The strategy presumes that competent HCPs and

managers would be able to generate quality data and use the information in decision-making. Shiferaw et al (2017:7) similarly reported higher odds of RHIS utilisation in Ethiopia among HCPs who were trained on HMIS compared to those who were not trained because trained professionals could compile, analyse, and use information in daily activities. Furthermore, training on data use in three African countries (Kenya, South Africa & Tanzania) was reported to have changed staff members' attitudes towards the ownership of data and improved their motivation to ensure the use of data in decision-making (USAID & MEASURE Evaluation 2018b:17).

- *Strategic action no 1.3: Promote accountability and commitment to data management*

The findings revealed that staff members lack interest and commitment in performing data management tasks, consequently neglecting these tasks. In addition to training, it is necessary to improve HCPs' interest, commitment and accountability for data management responsibilities (Booyens & Bezuidenhout 2017:385). To promote accountability and commitment in data management, the strategy proposes the inclusion of data management on employees' performance appraisal system by the district health management.

Performance appraisal is described as an organised process whereby an employee's strength and developmental needs are evaluated, and various methods are used to enhance the employee's productivity (Booyens & Bezuidenhout 2017:385). In order to enhance productivity, in this case, good data management, HCPs should be assessed based on the quality of data they produce and the use of information for decision-making. O'Hagan et al (2017:378) assert that evidence of data quality and information use should form part of job performance assessments. Before the assessment, personnel should understand the purpose and criteria used for the assessment based on the job description. As the direct supervisors, the facility managers should assess the HCPs' performance according to the set criteria on an annual basis. Their seniors, in this case, the area managers, should then assess the facility managers. Constructive feedback should be given immediately after the assessment. This process will ensure that HCPs and facility managers are monitored and evaluated on their commitment and productivity.

Monitoring and evaluation are considered necessary to hold people accountable for progress through actions and responsibilities (Nkomazana, Mash, Wojczewski, Kutalek &

Phaladze 2016:6). However, this process should not be used as a punitive measure, but a constructive activity that will be utilised to build data management capacity. In South Africa, the performance appraisal system is utilised to identify and address employees' developmental needs, and offer merit awards for improved and good performance (Booyens & Bezuidenhout 2017:385). Although merit awards in terms of money are typical to motivate employees' excellent overall performance, it is recognised that it might not be possible to offer money as recognition of only one aspect of job requirement, in this case, data management. Therefore, it is suggested that other forms of incentives like certificates of recognition, a delegation of more authority in data management, and other forms of tokens may be utilised to motivate employees, consequently improving interest in data management.

Lippeveld (2017:340) recommends implementing incentive-based systems as a human-centred approach for promoting the use of information. The strategy assumes that offering recognition, as a form of an incentive, will improve the HCPs' morale, consequently improving commitment and accountability to data management. The idea is supported by Akhlaq et al (2016:1319), who found that offering incentives was an essential motivator for using information in decision-making in low- and middle-income countries. Conversely, a lack of incentives was found to be a barrier to data quality and data use in decision-making (Muhindo et al 2016:6; Kumar, Gotz, Nutley & Smith 2018:e5).

#### 7.3.5.1.2 Strategy No 2: Ensure sufficient resource capacity for data management

Ensuring sufficient resource capacity in the health care facility was identified as one of the critical strategies required to improve the RHIS's performance in achieving quality documentation of patient information (Shihundla, Lebese & Maputle 2016:6). Therefore, it is crucial that the facilities have sufficient resources for patient care, patient clinical record keeping, and RHIS data management. The availability of human and technical resources for data management is necessary for generating accurate, complete and timely reproductive health data.

- *Strategic action no 2.1: Ensure the availability of human resources for data management*

To ensure that health facilities are well-staffed according to the facility workload, the facility manager must compile an accurate workload and facility normative guide and submit it to the district management to motivate staffing requests. The workload is described as work activities that take up most of the HCPs' daily working time (NDoH 2015:6). The normative guide is a standard used to calculate the minimum workforce categories and the number of HCPs in each category required to cope with the existing workload based on the expected package of services for the facility (NDoH 2015:v). To have an actual workload and facility normative guide, the facility manager must ensure that all staff members record all health care and administrative activities performed in the facility, including the facility headcount.

In the end, the facility manager should be able to prove that the current staff is not sufficient for health service provision and effective data management. Therefore, the facility manager should request for more staff based on the evidence from the application of the normative guide. In support of the need to have sufficient human resources for data management, the GP NDoH et al (2016:105-106) recommended that facility managers lobby for data capturers' long-term employment because most of them are employed on short-term contracts.

The district health management should review the existing health workforce against the normative guides and identify areas with greater or fewer human resources per category. Where necessary, human resources should be redistributed among health care facilities to ensure a fair number of different health workforce categories (NDoH 2015:18). If the workloads of some of the existing human resources for health categories are already high, then recruiting new resources may be the best solution (NDoH 2015:29).

Furthermore, the district health management team should promote staff retention to ensure that the facility does not lose too many human resources due to staff turnover, specifically due to resignations. Erasmus, Loedolff, Mda and Nel (2006 cited in LGSETA and URBAN-ECON 2019:42) created a five-step system (abbreviated as PRIDE) approach to promote staff retention. The five steps include the 1) provision of a positive working environment; recognising; 2) rewarding and reinforcing the right behaviour; 3) involvement and

engagement of personnel; 4) developing skill and potential; 5) measuring and evaluating performance. To ensure sufficient resources through the promotion of staff retention, the researcher is proposing the following actions be adopted from the PRIDE system for staff retention:

- The manager must provide a positive working environment by establishing an open and healthy working relationship.
- The manager, together with the district management, should develop a recognition and reward system for good performance to make people feel appreciated and essential.
- The manager, as a leader, should involve staff members in planning, decision-making and problem-solving. Engaged staff members develop a sense of ownership to decisions taken and have a sense of belonging in the organisation.
- Ensure that staff members have sufficient skills and competencies required to perform their duties effectively. Conversely, ensure that they acquire competencies and formal qualification for their career growth or advancement.
- Evaluate and measure employee job satisfaction to determine progress and areas for improvement. The job satisfaction evaluation includes the evaluation of staff attitudes, morale, motivation, and areas in which they need improvement. Together with the staff members, the manager should develop an employee job satisfaction plan and implement it.

- *Strategic action no 2.2: Ensure the availability of technical resources for data management*

The facility manager should make district and provincial management aware of the shortages of computers in the facilities. The implication of the shortage, particularly delayed capturing of data and transmission, should be clearly explained. The provincial and district management should ensure a sufficient budget for data management resources – adequate computers and internet connectivity. The budget should include the maintenance and service of computers, such as software updates. The computers should be equitably distributed to the facilities based on the needs of each facility. The availability of computers will ensure that the data are captured on time, while the internet facility will ensure the timeous transmission of data to the district. It is the national and provincial department of

health ICT units' responsibility to acquire hardware, software, and data storage for RHIS management (NDoH 2011:33).

The strategies acknowledge that computers' availability without a continuous internet connection and electric power supply may not be sufficient to improve the timelines of data reporting. Hence, the provincial and district health management must ensure continuous and stable internet coverage and power supply for all facilities. This could be achieved by budgeting for uninterruptible power sources to enable timely transmission of data from the facilities to the district in case of power failure.

The National Department of Health requires the NIDS to be reviewed every two years (NDoH 2011:20). Consequently, the data collection tools are changed to include revised elements and indicators. The process means a discontinuation of the old data collection tool and the utilisation of the new tool at the stipulated commencement date. Therefore, it is crucial for the provincial management team to have a plan in place to deal with the procurement and supply of new data collection tools during such transitions. All facilities should be supplied with the required number of tools before the new tool's implementation date. Moreover, the provincial head of departments must ensure the availability of financial resources to print data collection tools (NDoH 2011:23). This will prevent the continuing use of old tools beyond the set commencement date, thus reducing the data issues arising from outdated tools.

#### 7.3.5.1.3 Strategy No 3: Enhance support for quality data generation

The strategy postulates that HCPs' ability to generate quality reproductive health data relies on the degree of support they receive for data management. The support involves implementing data quality improvement measures, namely, enhanced data quality assurance practices, improved supportive supervision, and improved data collection processes.

- *Strategic action no 3.1: Enhance data quality assurance practices*

Enhanced data quality assurance measures are vital to address the data quality challenges discovered in the study. Data quality assurance practices are processes applied to assess and improve overall data quality (USAID & MEASURE Evaluation 2019c:9).

The first step in enhancing data quality assurance measures is to ensure that all staff members are aware and comply with the DHIMIS SOP and policy requirements at all times. It is recommended that the DHIMIS SOP and policy become a permanent agenda item at facility monthly meetings. A re-emphasis of the SOPs at various levels is also necessary to improve the data management process (GP DoH et al 2016:106). The availability and application of SOP reflect good governance and dedication in achieving the highest standard quality data as a basis for generating "information for policy-making, planning, monitoring health outcomes and evidence-based decision-making" (Cheburet & Odhiambo-Otieno 2016a:204).

In addition to the re-enforcement of the SOP and policy, the strategy proposes the inclusion of reproductive health data into the data quality assessment system, data review meetings, and data quality audit as routine measures for data quality assurance. Data quality assessment is described as a process that involves a regular review of the performance of the HIS as measured by the level of data quality and the use of information for decision-making (USAID & MEASURE Evaluation 2015:40). The facility manager and the data champion should perform the data quality assessment every month before submitting reports to the next level. This might prevent the submission of inaccurate data to the next level. USAID and MEASURE Evaluation (2015:40) recommend using standardised tools for data quality assessment to ensure the comparability of results. The author further states that the results should be recorded and monitored over time to follow trends in data quality performance. Therefore, the district HIM directorate should develop a standardised assessment tool that will be utilised by all facilities.

The assessment should focus on the accuracy of the collected data, data collation, and transmission. The collected data's accuracy should be assessed by comparing data recorded on the paper-based data collection tool (MDS tool) with the data recorded in the patient's file; the data should tally. The data collation should be assessed by recounting the

data entries on the paper-based data collection tool and comparing the recorded totals on the tool with the recount's totals. Simultaneously, the data transmission should be assessed by comparing the data captured on the electronic tool with the data on the paper-based tool.

Furthermore, the submission of data to the next level should be assessed to check compliance with the timelines of submission. The records of assessments should be kept safe and utilised to assess improvements. The data quality assessment is deemed useful because of the potential to uncover hidden problems in data collection, aggregation and transmission (USAID & MEASURE Evaluation 2015:40).

In addition to data quality assessment, reproductive health data should be included in the data review meetings conducted quarterly with health facility staff at the district level. In their study, assessing the quality assurance of health management information, Kagoya and Kibuule (2018:10) recommended regular data review meetings to discuss data. The authors argued that meetings would provide an opportunity for continuous sensitisation, explaining misunderstandings, enable information sharing, and facilitate replication of quality assurance practices in health care facilities (Kagoya & Kibuule 2018:10). The review should discuss reproductive health data quality, trends in the programme's performance, and share best practices. The inclusion of HCPs in the review meeting will address the misunderstandings about reproductive health data elements found in this study.

USAID & MEASURE Evaluation (2019c:11) recommend consistent, frequent data review meetings to assess trends and address discrepancies among actors at all levels of the health systems. The review mechanisms will allow the health system to review and validate data, develop information-sharing products, and provide a setting to make data-informed decisions on various issues, including service delivery (USAID & MEASURE Evaluation 2019c:10). In Kenya, the implementation of data review meetings improved data users' understanding of the extent of data quality issues. Furthermore, the meetings promoted an environment where data quality was taken seriously and perceived as valuable, resulting in increased accountability for the programmes reviewed at the meetings (MEASURE Evaluation 2018c:17, 18). The strategy suggests that the data review meetings will create a data sharing and learning platform for facility managers and HCPs from different facilities. Facilities will review their data quality status, consequently making decisions on improving the quality of reproductive health data.

The decision to improve the quality of data should be recorded; hence, it is necessary to have a template for a data quality improvement plan. The template should be developed by the district HIM directorate and must include specific interventions, steps to be taken, responsible person(s), and timelines for the implementation of the plan (MEASURE Evaluation 2015). The plan's implementation is crucial in ensuring that the shortfalls identified during the assessment are addressed. To ensure uniformity, consistency and comparability among facilities, the district HIM directorate must develop a standardised procedure to monitor the implementation of the data quality improvement plan. The monitoring will also assist in determining the progress made in the data quality improvement plan.

Finally, data quality audits for the CYPR indicator should be conducted annually. The data quality audit is regarded as a rigorous data quality evaluation mechanism, implemented infrequently, and involving a team of auditors from outside the organisation (USAID & MEASURE Evaluation 2015:40). Similar to the data quality assessment, data quality audits assess the accuracy, reliability, comprehensiveness, timeliness, and integrity of information reported through programmes (USAID & MEASURE Evaluation [Sa]). While the responsibility for conducting audits lies with the provincial government, it is the facility manager' task to ensure that the facility is ready for audits by ensuring programme documents are available as evidence (NDoH 2012a:18). Therefore, the Gauteng Department of Health should organise data quality audits for all facilities annually and ensure that the audits are conducted using standardised RHIS data quality audit tools. The department should ensure that the facility managers are aware of the requirements of an audit and are ready for the audit. Consistent data quality audits will ensure that facilities maintain high standards of quality data and use of information. Such audits also help develop confidence in the results reported by programmes (USAID & MEASURE Evaluation 2015:42).

- *Strategic action no 3.2: Improve supportive supervision*

In order to improve reproductive health data management, it is essential to improve supportive supervision, which is regarded as a way to encourage performance, productivity and motivation (Nkomazana et al 2016:1). The proposed strategy focuses on standardising

supportive supervisory visits to ensure consistent and adequate support for data management.

The HIM directorate at the province and district level should design the SOP for supportive supervision on HIM to regulate the implementation of support at the district level. The guideline should describe all activities to be performed prior, during and after each supervisory visit, and the frequency of the visits. The SOP implementation needs to be reinforced through training and monitoring health information officers. The SOP will ensure that all health care facilities are supported.

The health information officer should develop a schedule and conduct supportive supervision on all facilities quarterly. The schedule should be sent to the facilities in advance before the visit, and a standard checklist should be developed and used to ensure objectivity. The checklist should contain all activities to be performed during supervision. The activities will include the assessment of data quality (completeness, timeliness, accuracy) and evidence of the use of information for decision-making in the facility. The checklist should also have a space for comments and record on-the-spot training given and the discussion of challenges during the visit. The checklist will ensure a fair and uniform experience of supervision and promote a comparison of performance across facilities (USAID & MEASURE Evaluation 2015:82).

The use of the standardised checklist in Ethiopia provided direction action-oriented feedback on HMIS data quality and information use (Dufera et al 2018:235). Similar to the data quality assessments, the findings from supportive supervisory visits should be reviewed and acted upon by implementing an improvement plan to correct insufficiencies. This view is supported by Chen et al (2019:14), who stated that supervisors in the health care departments and health facilities should perform real-time field quality assurance and control activities. Kagoya and Kibuule (2018:10) posit that district-level supervision for health care facilities are necessary to monitor data quality checks and improvement, and provide opportunities for on-the-job training.

Although all HCPs must be supported, HCPs returning from training need immediate support to ensure successful implementation of the skills they acquired during the training. Training alone was reported to be insufficient to build capacity in data-use core competencies (USAID

and MEASURE Evaluation 2018c:27). Hence, supportive supervision is critical for the reinforcement of the knowledge and skills attained during training and to ensure that new skills are applied in the workplace (USAID and MEASURE Evaluation 2015:81; USAID and MEASURE Evaluation 2018c:27).

The supervisor/health information officer should provide verbal feedback about the visits to the HCP and the facility manager immediately after supervision. A standardised written feedback report should be compiled and shared with the HCP and the facility manager shortly after the visit. The report will help track the results and monitor the trends with respect to the quality of data and the use of information. Nkomazana et al (2016:6) state that supervisors should give the HCPs feedback on jointly identified challenges. Feedback is vital to programme improvement and sustainability, and for the overall satisfaction of supervisors and supervisees (Marshall & Fehringer 2013:15).

Finally, the district HIM directorate should compile a report on the number of visits conducted. The report must be sent to the next reporting level (provincial level) to ensure compliance with supportive duties.

- *Strategic action no 3.3: Improving the data collection process*

To improve the quality of reproductive health data, this study recognises the need to improve the data collection tool's design to make it simple and user-friendly and to implement DHIS2 at the point of service. The tool's design and electronic collection is regarded as crucial mechanisms for quality data collection (Chen et al 2019:2). Below are the proposed activities to improve the design of the data collection tool.

As discussed in Chapter 5, the facility managers recommended the removal of data elements that are not relevant for their facilities as a measure to the tool's design. Furthermore, they recommended immediate capturing of data into DHIS2 at the point of service. Therefore, the strategy proposes that the department of health and partners supporting HIS (e.g. Health Systems Trust and Health Information System Programme) should review the data collection tool's layout and design so that it contains only data elements relevant for the services provided in the facility. It will mean that the data collection tool for the primary health care facilities will not be the same as the tool for the community

health centres and the hospital because of the difference in the comprehensiveness of the services. Literature endorses simplifying data collection tools as a strategy to strengthen the RHIS (Chen et al 2019:12; Ohiri et al 2016:328). In Haiti, simple and precise data collection tools also resulted in improvements in data collection (Marshall & Fehringe 2013:11).

Additionally, implementing the DHIS2 system directly from the point of service will reduce the data accuracy errors and improve the timeliness of reporting. DHIS2 will remove data aggregation responsibilities from the data collectors because the system will automatically aggregate the data, thereby reducing errors. Second, late reporting will be prevented because there will be no need to wait for the data capturer to capture the data. Therefore, the facility manager will always have current data at their disposal; it will only require verification and saving. Given that it is a web-based system, the data will automatically be available at the next level of reporting (district level). HST (2015:39) affirms that DHIS2 will allow facilities to aggregate the data as soon as it is generated. The system will improve the timeliness of the data, thereby reducing the 45 days required for data to move from the collection point to the national level. Computerising the manual systems for data collection and sharing was reported to be a facilitator for exchanging health information in low- and middle-income countries (Akhlaq et al 2016:1319).

#### 7.3.5.1.4 Strategic no 4: Simplify the CYPR indicator

To improve the reproductive health data management process, it is essential that the indicators for the reproductive health programme be simple for data collectors and users to understand. The proposed activity for simplifying the CYPR follows.

- *Strategic action no 4.1: Review the use of conversion factors when calculating the CYPR so that it reflects an actual program performance*

The CYPR is widely utilised in many countries for measuring the level of protection against pregnancy over one year, given the number of contraceptives dispensed (HST 2016:98, 99). The strategy suggests that the NDoH, in consultation with other stakeholders, should review the use of conversion factors when calculating the CYPR indicator to ensure that it reflects the reproductive health programme's performance accurately. The CYPR was found to be complicated and less sensitive to change, hence it should be reviewed. An ideal indicator

for measuring programme performance should be reliable, appropriate, valid, easy to understand and sensitive to change (HISP [Sa]:56). The convention factors indicate the number of years the method has been offering protection from pregnancy. However, these factors are based on 'typical use', not 'correct use'. For instance, the IUCD and the subdermal implant offer protection for 10 and three years, yet the convention factors give them four and half (4.5) and two-and-a-half (2.5) years, respectively (Massyn et al 2020:66).

The review should also consider the credit/weighting of LARCs on the CYPR. Currently, sterilisation is considered to offer protection from pregnancy for nine years according to the given conversion factors; however, all the credit is given to the year when the method was accepted (MEASURE Evaluation 2015). MEASURE Evaluation (2015) proposes that credit be allocated over the nine years of estimated protection (annualised). Annualising the credit will give an accurate picture of CYPR's performance, as it is supposed to measures the level of protection against pregnancy over one year.

#### 7.3.5.2 KRA 2: Using reproductive information health information in decision-making

KRA two aims to improve the use of reproductive health information for decision-making at the facility level. For this to happen, there should be a culture of information use at the facility level. Generated information should be used to improve the performance of the CYPR indicator. The information should be reliable, and evaluation measures should be in place on the performance of the RHIS in managing reproductive health data.

##### 7.3.5.2.1 Strategy no 5: Improve the culture of information use

A culture of information use refers to the customs, beliefs and behaviours of a particular organisation to support and encourage the use of information to inform decision-making (Arenth et al 2017:8). The strategy proposes that the culture of information use could be enhanced by improving data generators' and data users' participation in decision-making and improving the use of information at the facility level.

- *Strategic action no 5.1: Improve the participation of data generators and data users in decision-making*

The strategy considers facility managers' involvement in programme planning, especially when setting the target for the indicators (e.g. CYPR) as the first step in improving data generators' and users' participation in decision-making. The district HIM directorate, monitoring and evaluation managers, and health programme managers should discuss the target for the CYPR with the facility managers because they are also the main stakeholders in health service provision and data management. Managers at the facility level have relevant experience with the circumstances affecting the CYPR's performance; hence, they are in a good position to share more insight that will enable all stakeholder to set a realistic target. The target should be based on evidence from existing programme performance and historical trends, as reflected by the RHIS data (DoH 2011:22; USAID & MEASURE Evaluation 2015:78).

The second step in improving data generators' and users' participation is to communicate data and information by giving monthly feedback to all staff members on the quality of reproductive health data and the programme's performance. The HIM directorate should provide verbal and written feedback reports to the facility managers at the service points (NDoH 2012a:15). In turn, the facility managers must provide monthly feedback to the HCPs concerning data quality (timeliness, completeness and accuracy) and programme-related performance in term of indicators (NDoH 2012a:18). Therefore, the monthly meeting mentioned in Chapter 5 must be effectively utilised to share and discuss the level of reproductive health data quality and the programme's performance. The facility manager should ensure that the HCPs understand the quality of data being produced and the performance of the CYPR in comparison to the set target. The information should be shared using tables and graphs to ease visualisation and enhance understanding.

To improve access to information, the district HIM directorate should generate quarterly reproductive health performance graphs for each facility. The facility managers should ensure that the graphs are displayed on notice boards and updated every quarter. The NDoH (2012a:16) agrees that the health information officers must give the health facilities feedback using updated graphs to display in the facility.

As discussed in Chapter 2, the aim of HIM is to generate information that will be used to improve health services. The plan for improving the services at the facility level is called an operational plan. Although the responsibility of developing an operational plan lies with the facility manager, it is critical that all HCPs are actively involved. This will ensure adherence to the DHMIS SOP, which stipulates that facility managers, in collaboration with facility staff, should develop plans for improving indicators that reflect poor performance (NDoH 2012a:18). The plans should be made available to all staff members. All staff members should also be aware of all the activities stipulated in the plan because they are responsible for implementing the plan. The responsibilities should be emphasised in weekly and monthly meetings.

In addition to the involvement of HCPs in the development and implementation of the operational plan, the facility managers should establish participatory management approaches to ensure HCPs involvement in problem-solving and decision-making. Participative management is described as a system of management where subordinates are actively involved in solving problems and making decisions about their jobs (Booyens & Bezuidenhout 2018:11, 465). The participatory management plan should be standardised in a manner that weekly and monthly meetings are utilised as a platform to discuss and find possible solutions to problems and make decisions. Meetings should include identifying and analysing the root cause of data quality and performance issues; in this case, the low performance of the reproductive health programme. The facility manager must facilitate the meeting in such a manner that all staff members feel free to share their views, suggestions and plans to resolve the challenges. The decision taken should have considered suggestions and be agreed upon by all staff members. Booyens and Bezuidenhout (2018:11) assert that in participative management, managers need to be open with staff members, encourage and consider contributions, and facilitate rather than direct the workforce.

Employees' active participation in problem-solving and decision-making was found to increase employee motivation, boost employee morale, and reduce resistance to new processes (Booyens & Bezuidenhout 2018:11, 465; Irawanto 2015:161; Ugwu, Okoroji & Chukwu 2019:57). Furthermore, it increases job satisfaction and successful teamwork with supervisors (Irawanto 2015:161). Participation leads to high creativity, empowers employees, and helps to cultivate innovation (Ugwu et al 2019:57). If implemented

appropriately, participative management can improve staff members' level of work commitment, confidence, and job performance (Ugwu et al 2019:57). The active involvement of HCPs in problem-solving and decision-making is envisaged to improve their interest, confidence and commitment towards data management. Furthermore, HCPs might be motivated to create innovative strategies to improve the quality of data and use the information to improve the CYPR indicator's performance.

Finally, data generators' and data users' participation in decision-making could be improved by modifying the composition of the performance review team to include HCPs and data capturers. This will ensure a joint review of information by all stakeholders involved in data management. The review will facilitate discussions on data quality issues and their link to programme performance. Consequently, this will improve their understanding of the extent of data quality issues and how they impact on programme performance (USAID and MEASURE Evaluation 2018c:17).

- *Strategic action no 5.2: Improve the use of information at the facility level*

The facility manager should ensure that available information is used to determine if the facility is on track to meet set targets by analysing trends over time. There must be a comparison of the current performance with the previous months, quarters and years. This will provide a clear view of the progress made towards the coverage of the target population within the catchment area, thereby assisting in designing action plans to improve the performance. Hassan (2016:29) affirms that data generated from routine health information reveals trends in the uptake of contraceptive methods among women of reproductive age.

The available information should further be used to compare the indicator's performance among facilities in the district. This could be achieved by using the pivot table generated by the DHIS software to view all facilities' performance in the district and the dashboard tables. Following a comparison of the performance among the facilities, the facility manager should seek and share best practices for improving service delivery to patients. This could be achieved through the discussions held at the performance review meeting. The manager could further visit high-performing facilities for benchmarking, and adopt appropriate strategies to improve service delivery.

Good infrastructure, equipment and sufficiently capacitated human resources are essential for improving the service and the programme's performance. Therefore, the facility manager should use the available information to inform essential management practices, including budgeting, planning of infrastructure, equipment and human resources. The information generated from the RHIS (e.g. the facility monthly headcounts and number of contraceptive methods administered every month) could be used as a support mechanism in addressing the need to expand the budget for resources. Hassan (2016:31) posits that information generated from the health management information system is extremely relevant when considering budget allocations for reproductive health and family planning. It should thus be included when planning programmes' design and implementation.

#### 7.3.5.2.2 Strategy no 6: Improve the performance of the CYPR indicator

The researcher believes that the CYPR indicator's performance could be improved by ensuring that facilities offer a wide range of contraceptive services and all contraceptive services are reported to the district level. Several strategies are provided next towards this aim.

- *Strategic action no 6.1: Improve skills for reproductive health service provision*

The strategic action for improving reproductive health service skills focuses on improving HCPs' capacity to offer LARCs as a measure to improve the reproductive health programme's performance.

To that end, the facility manager should conduct a training needs assessment to identify staff who need training on LARCs, the IUCD, and the Implanon implant. The assessment should be submitted to the HRD department at the district level, who should establish a budget for training. They should also develop a schedule to train HCPs and facility managers on LARC methods. Once there is a schedule, the HRD unit should identify training facilitators with sufficient knowledge and skills on the insertion and removal of LARCs. These individuals will offer training and supervisory support after the training. To expand the resources for training, the HRD can develop a partnership with NGOs, contraceptive suppliers, and higher education institutions to train HCPs on the insertion of LARCs, mainly

the IUCD and implant. The training should include counselling and the clinical skills required to safely offer LARCs (Haider et al 2019:21).

Once the resources are in place, HCPs and facility managers' training – mainly on the insertion and the removal of the LARC – should be conducted quarterly. Following the training, reproductive health programme managers and coordinators must provide mentoring and support to ensure that the acquired skills are practised to develop competency. These activities will increase the utilisation of the LARC, consequently improving the performance of the CYPR. Haider et al (2019:21) and Silumbwe et al (2018:8) recommended mentoring personnel to ensure that skills learned during the training are practised. Lamani et al (2018:41) found LARC training in Malawi increased the uptake of the method because HCPs were skilled on the insertion and removal of the methods.

The HRD unit should develop a training database to monitor the implementation and effectiveness of the training plan. The data should be used to identify the percentage of trained HCPs in each facility and link it with service improvement. Service improvement will be reflected by an increase in the uptake of LARCs, subsequently increasing the performance of the CYPR.

Training updates should be conducted whenever necessary, especially when there is a new supplier of IUCDs, and the insertion requires different technical skills compared to the previous supplier. Haider et al (2019:21) affirm that training updates and refreshers are necessary when there are new approaches and technologies.

- *Strategic action no 6.2: Improve the accuracy of CYPR*

This strategy acknowledges the possible negative impact of private practitioners' non-reporting of contraceptive services on the performance of the CYPR. Therefore, it is proposed that private practitioners report the contraceptive services they provide to the district office.

It was reported that 20% of South Africa's population receive health care in the private sector, while CYPR data only represent the contraceptive provision in the public sector (HST 2016:99). Thus, the NDoH should amend the National Health Act (Act 61of 2003) on

information management and mandate private practitioners to report all data on contraceptive services to the district offices. Such an amendment will ensure that the private practitioner sends data on contraceptive services to the district offices each month. The process is considered necessary because the denominator for calculating the CYPR uses the population (women aged between 15 and 49 years).

It is also noted that the current DHMIS policy does not apply to the private sector (NDoH 2011:13) and should be reviewed to include the management of data from private practitioners. It is envisaged that if private practitioners report contraceptive data to the district office, the CYPR performance for the entire district might improve. At the same time, the CYPR would probably reflect the actual coverage of the entire district.

#### 7.3.5.2.3 Strategy no 7: Establish measures to evaluate the performance of HIMS in managing health programme data

The HIMS is a health support programme, and its performance should be evaluated to determine if it is meeting the intended purpose. The purpose of the HIMS is to generate information that will be used in improving the efficiency and the effectiveness of health services (Abera et al 2016:99; Alipour & Ahmadi 2017:313; Macfarlane & Abouzahr 2019:7). The following strategic action was deemed necessary to evaluate the performance of HIMS in managing reproductive health data.

- *Strategic action no 7.1: Design HIMS evaluation approaches*

Few evaluation approaches can be used to evaluate the performance of HIMS in managing reproductive health data, including the routine data quality assessment (RDQA) and the PRISM framework. The RDQA is used to assess the quality of programme data, and enable programme managers to strengthen the data management and reporting system (PEPFAR et al 2017:1). The PRISM framework is used to assess the reliability and timeliness of a RHIS in making evidence-based decisions. The framework identifies gaps in an RHIS so they can be corrected, and the system can be improved (USAID & MEASURE Evaluation 2019b:8). The PRISM framework has standardised tools that could be used to evaluate the quality of data and the use of information. This approach does not only evaluate the outcome of RHIS outputs (quality of data and the use of information) but also the process and the

determinants of the system (behavioural, technical, and organisational) (USAID & MEASURE Evaluation 2019b:8).

Taking the uses of each evaluation approach into consideration, the district HIM directorate should decide on the most suitable approach that could be employed for the evaluation. Once a decision about the approach has been made, the district HIM directorate should develop a plan to evaluate the performance of RHIS in generating quality reproductive data and the use of information for decision-making. This evaluation should be conducted annually, utilising a standardised tool; a standardised tool will allow comparisons between facilities to assess changes in the performance over a given period.

## 7.4 SUMMARY

This chapter outlined how the strategies for improving reproductive health data management were developed and evaluated to ensure their validity and appropriateness for Tshwane district health facilities. Successful implementation of the strategies could improve the performance of RHIS in managing reproductive health information. The facilities will be able to generate quality reproductive health data and use relevant information for decision-making. Decisions that are taken based on evidence from the RHIS could improve reproductive health services, consequently improving the CYPR indicator's performance.

# CHAPTER 8
# SUMMARY, CONTRIBUTIONS, RECOMMENDATIONS, LIMITATIONS AND CONCLUSIONS

## 8.1 INTRODUCTION

This chapter presents the conclusions of the entire study. It summarises the findings and the development of strategies to improve the performance of the RHIS in managing routine reproductive health data using the DHIS. It also discusses the contributions, recommendations, limitations and conclusions of the study.

The study's purpose was to evaluate the performance of RHIS using DHIS in generating quality routine reproductive health information (couple year protection) in the Tshwane district, with particular focus on the factors involved in data management processes and the use of information in decision-making. The ultimate aim was to develop strategies to improve the management of routine reproductive health data, thereby improving the quality and the use of information for decision-making.

The study consisted of three phases and adopted a sequential explanatory mixed-method design involving both quantitative and qualitative approaches. The first phase applied adapted PRISM tools to collect quantitative data from 111 HCPs and review six months' worth of monthly reports. The data were quantitatively analysed using the SPSS program for Windows. The second phase involved the collection and analysis of qualitative data from 11 facility managers using thematic analysis. Both designs were given equal priority and findings were integrated during the interpretation. The interpretation was followed by phase three, which involved developing strategies based on the study's findings and available literature. A two-round modified Delphi technique was used to seek consensus from experts concerning the validity of the strategies.

## 8.2 SUMMARY OF STUDY FINDINGS

The study findings are based on the meta-inference of the quantitative (phase one) and qualitative (phase two) results. The strengths of mixed-method research were leveraged to

provide insights into the performance of the RHIS in managing reproductive health information and its determinants.

### 8.2.1 Competence in RHIS task: Opportunities for data quality improvement

One of the performance measures for the RHIS is the quality of data it generates. The findings suggest a link between behavioural factors and the quality of reproductive health data. These include HCPs' competencies and their interest in performing RHIS tasks. It is evident from the study that there were challenges with the quality of reproductive health data being generated by the system, in terms of data accuracy and the timeliness of monthly reports. This data inaccuracy resulted from HCPs' lack of competencies in RHIS tasks and insufficient understanding of the reproductive health data elements. HCPs therefore required training, because the majority of HCPs did not attend the three to five days' RHIS training.

The HCPs' perceptions concerning data management appear to have negatively affected their interest and commitment to the task; some continued to generate inaccurate data despite managers' in-service training. Therefore, HCPs' competence and commitment to performing RHIS tasks are necessary factors for improving data accuracy. Managers also played a significant role in ensuring that the system generates quality data by monitoring the data collection process, verifying the data and ensuring that data were captured into the electronic tool every week to facilitate the timely transmission of reports, which was not always realised. Late submissions seemed to be attributed to the shortage of data capturers at the facility level.

### 8.2.2 Perceived confidence in data processing: Complexity of the CYPR indicator

The study identified technical factors were influencing data management. The first factor is the CYPR indicator, which was found to be complicated due to the use of conversion factors and the formula used to analyse it. The conversion factors were supposed to indicate the number of years women are protected from pregnancy when using a specific method. This formed the numerator, while the denominator was all women aged 15 to 49 years. However, the number of years is reduced as compared to the duration of protection indicated in the contraceptive and fertility planning guidelines (NDoH 2012c:32) since the factors are based

on typical use, not perfect use of the method. For example, the implant offers protection for three years but is converted into two-and-a-half years when calculating the CYPR (Massyn et al 2019:66). For this reason, the formula used in calculating the CYPR does not appear to be accurately measuring the number of women protected against pregnancy.

Managers in this study lacked an understanding of how the target for the CYPR is calculated. They further demonstrated discontent with the performance of the CYPR. It appears that performance does not improve even though facilities have implemented measures to advance reproductive health service provision (e.g. increasing the uptake of LARC). The complexity of the indicator and the lack of training discussed earlier were deemed to have negatively affected HCPs and managers' confidence in analysing and presenting reproductive health information.

### 8.2.3 Design of RHIS: Complex data collection tool

The second technical factor identified was the complexity of the paper-based data collection tool. This tool was found to be congested with many data elements making it not user-friendly. The tool's design meant it was easy to record and aggregate data incorrectly, thereby impairing the quality of reproductive health data. For the tool to collect accurate data, it should be simplified by removing irrelevant data elements. Alternatively, data should be directly captured into the electronic tool at the service point. It is envisaged that electronic recording will reduce data collection and collation errors, thereby improving the system's performance.

### 8.2.4 Culture and practices of information use: Low participation of HCPs in information use

A suboptimal culture of information use was found at the facility level. This is evidenced by the opposing views of information-sharing practices, and contrasting opinions regarding HCPs' participation in decision-making and problem-solving. Some HCPs received monthly and quarterly feedback on the programme's performance, which was not always supported by evidence from the collected data. However, managers expressed that weekly meetings are utilised to give feedback and involve HCPs in decision-making and problem-solving.

A suboptimal information culture undermines the value of information being used to improve service delivery. HCPs low participation in decision-making may result in a lack of motivation and ownership of the decisions made; consequently leading to a lack of commitment in implementing them.

Despite the low culture of information sharing, the study showed that managers utilised the information generated from the RHIS to monitor the contraceptive methods' utilisation rates, evaluate the coverage of the target population (the performance of CYPR), ensure sufficient resources, budget and supply chain management, and perform comparisons between pregnancy and contraceptive use. By monitoring the CYPR indicator, it was determined that the reproductive health programme was not performing well due to the low uptake of LARC methods, specifically the IUCD. Two decisions were made to improving the performance of CYPR, namely, educating patients and ensuring community mobilisation on the availability of LARC; and reducing waiting times at the facility. However, those decisions were not sufficient to improve the performance of the CYPR because facilities did not have enough HCPs with skills to insert the IUCD. The other challenges were the shortage of contraceptive methods, patients' preferences to SARC methods (oral and injections), and the use of private practitioners who do not report the information on the RHIS. The oral pills and the injection carry less weight on the performance of the CYPR as compared to the IUCD (Massyn et al 2019:155).

### 8.2.5 Existence of procedures and tools for RHIS: suboptimal access to data management resources

The study has shown good governance of data management from the NDoH. The availability of a DHMIS policy and SOP reflected this. These procedure tools provide guidelines concerning the collection of quality data and the use of information (Belay et al 2013:23). Besides the policy and the SOP, facilities had definitions for indicators and data elements, along with operational plans. The operational plan guides programme activities and ensures that it is on track to meet the performance target (USAID & MEASURE Evaluation 2015:78). However, some HCPs experienced difficulties with the tools' access and implementation, and more than one-third of the HCPs were not aware of their availability. Thus, some HCPs were collecting data without the proper knowledge of guidelines (DHMIS SOP), and without

knowing the meaning for reproductive health data elements. Furthermore, they provide the service without knowing the performance target and activities required to meet that target.

A gap was identified in terms of the district and provincial management procuring and supplying data collection tools. As a result, there was an apparent shortage of data collection tools, mainly during transitions between old and new tool, suggesting suboptimal support for data management from the organisation.

### 8.2.6 Organisational support: challenges with supportive supervision

Supportive supervision on data management was deemed unsatisfactory in this study. Not all HCPs and facility managers received quarterly supportive supervision visits. The activities conducted during the visits also appeared not to be standardised; HCPs could not agree that all health information officers check the quality of data, discuss performance, discuss challenges, conduct on-the-spot training during the visit, and supply supervisory feedback. This shows a lack of standardisation of supervision at the district level. Too few quarterly visits and the lack of standardisation of supervisory activities reveal non-compliance to the supervision requirements from the South African National Department of Health, DHMIS SOP (NDoH 2012a:15). Unsatisfactory supportive supervision also reflects insufficient organisational support for data management, which influences the quality of data generated and the subsequent use of information for decision-making (Mucee et al 2016:669).

### 8.2.7 Capacity for data management: Significance of resources

The facilities in this study lacked the resource capacity for data management. HCPs, data capturers and computers were reported to be insufficient for data management. The available HCPs were overburdened with health care activities, subsequently overlooking the data management process, thus generating poor-quality data that did not produce useful information (Wandera et al 2018:22). The shortage of other supporting staff at the facilities (e.g. administrators) resulted in data capturers multitasking, increasing their workload, affecting the timeous capturing of data, and submitting reports. Furthermore, ICT equipment like computers was deemed insufficient for data capturing, negatively affecting reporting timeliness (GP DoH et al 2016:65). A lack of resources indicates insufficient organisational

advocacy and commitment for effective health data management (Seitio-Kgokgwe et al 2016:9).

### 8.2.8 Capacity building: Significance of RHIS formal training

The lack of formal training on the RHIS in this study appears to have negatively affected the performance of the RHIS in managing reproductive health data. Untrained HCPs appeared to have an insufficient understanding of the importance of data collection and its impact on facility performance. As mentioned earlier, most sampled HCPs did not understand the recording of data elements, and they were less confident in analysing and presenting data. Training only took place annually due to a scarcity of training resources. This finding reflects insufficient organisational support for data management from the district level (Akhlaq et al 2016:1318).

### 8.2.9 Specialised skills for reproductive health service: Need for developing competencies

The study revealed that the CYPR indicator's performance is negatively affected by the low uptake of LARC methods. The low uptake is caused by a lack of specialised skills and competencies required to insert the LARC, specifically the IUCD. The use of an IUCD significantly increases the CYPR indicator's performance; more so than the SARCs, because IUCDs weigh more when calculating the CYPR as it offers longer protection (Massyn et al 2019:155; Lemani et al 2018:43). HCPs' lack of competencies could be attributed to insufficient training and mentoring because only 46% of HCPs were trained to provide reproductive health services.

## 8.3 DEVELOPMENT OF STRATEGIES TO IMPROVE THE PERFORMANCE OF RHIS IN MANAGING REPRODUCTIVE HEALTH INFORMATION

The strategies were developed by merging the results of the first two phases of the study and incorporating available literature. The draft strategies were validated by employing a two-round modified Delphi technique. Experts in data management, reproductive health and training participated in the validation process to gain consensus on the main strategies,

actions, activities, responsible person/unit, time frames and outcomes. The final strategies were developed, as discussed in Chapter 7.

The strategies focus on building capacity in data management; ensuring sufficient resource capacity for data management; enhancing support for generating quality data; simplifying the CYPR indicator; improving the culture of information use; improving the performance of the CYPR indicator; and establishing measures to evaluate the performance of the RHIS in managing routine reproductive health data. It is recommended that the Tshwane district health facilities, mainly the primary health care facilities, community health centres, mobile clinics, district hospitals and the district health office should implement these strategies. The strategies can also be implemented in other districts in Gauteng Province and other provinces with a similar context.

## 8.4 CONTRIBUTIONS OF THE STUDY

The study made a significant contribution to research in two critical areas, namely routine HIM studies and reproductive health programme studies. The reviewed literature reflected significant challenges in the area of this study. The importance of the RHIS informing decision-making in the health care system was highlighted (Abera et al 2016:100; USAID & MEASURE Evaluation 2019a:6). The prevalence of poor-quality data and suboptimal use of information for decision-making in developing countries were also clearly depicted, as articulated by Ahanhanzo et al (2015:6), Kebede et al (2020:6), and Manya and Nielsen (2016:123).

The theoretical framework was applied consistently throughout the study and highlighted the significance of behavioural, technical and organisational factors in evaluating the system's performance. The findings confirmed that the determinants directly influence the data management processes, which affect the performance of the RHIS in managing routine reproductive health data. The study revealed poor competence among HCPs for data collection and processing, a lack of interest and high workload, which were recognised as the key behavioural factors associated with poor data quality. These findings were supported by Kebede et al (2020:8), Nicol et al (2016:67), and Teklegiorgis et al (2016:7). The interplay between behavioural, technical and organisational factors was demonstrated. There was also an observed influence of organisational factors on behavioural issues, in relation to

insufficient training, lack of resources, inadequate supervision, lack of recognition and incentives.

There was a clear relationship between operational factors and the performance of the RHIS in managing routine reproductive health information. Data accuracy was related to the distinctive identified behavioural factors, such as a lack of HCPs' interest and commitment to data management; this was found to impact HCPs' competency in RHIS tasks. The study also reported on HCPs' poor understanding of how to record the data elements, even though the definitions and the criteria for the data elements were included in the data collection tool. This also happened regardless of the interventions by managers in terms of providing in-service training on the meaning of data elements and indicators. The situation seemed to have been exacerbated by the complex design of the data collection tool. This signalled a need for authorities to design simple but effective tools, as indicated in the developed strategies.

This study showed that facility managers played a significant role in supporting data management. In addition to the in-service training they provided, managers were tasked with ensuring data quality through several processes. It is a huge responsibility to ensure that useful data are generated and used to monitor the programme's performance. However, the study identified unique challenges, especially around the culture of information use at the facility level. It would appear that the HCPs were not actively involved in problem-solving and decision-making, contrary to management's claims. The primary staff member involved seemed to be the champion for data management (a HCP trained on the RHIS and responsible for data management at the facility). This system of only involving the champion has a negative impact on the sense of ownership experienced by other HCPs. As a result, HCPs seemed unmotivated to use the information to improve the performance of the RHIS and reproductive health services. Therefore, all HCPs need to be involved.

The study also found that a lack of managers' involvement when setting the target for the CYPR affected the use of reproductive health information, mainly in terms of understanding how the target is calculated. This was evidenced by their belief that the target was unrealistic and unattainable. In addition, their lack of understanding seemed to be aggravated by the complexity of the formula used to calculate the CYPR indicator, highlighting how technical factors affect the performance of the RHIS.

Other contributory factors related to insufficient skills on LARC methods and a lack of reporting from private HCPs offering contraceptive services. The facilities were unable to improve the performance of CYPR due to too few HCPs with necessary skills for inserting the LARC. The reporting of reproductive health services by private practitioners was also crucial because the calculation for CYPR includes the population as a denominator. Despite the identified weaknesses, the study also showed some strengths in using the RHIS in informing decision-making on reproductive health services. For instance, the decisions taken to reduce waiting times for the service, and educating patients and the community about the availability of LARC as measures to improve the reproductive health programme.

The study's significant contribution is that it highlights the reciprocal relationship between the three determinants of data management processes. This culminated in strategies being developed to improve the performance of the RHIS in managing reproductive health information.

## 8.5 RECOMMENDATIONS

Based on the findings of the study, the researcher makes the following recommendations for the following data management stakeholders:

### 8.5.1 Health care providers

Evidence from this study suggests that HCPs' interest, commitment, competencies, and confidence in data management are critical in generating quality data and information use. HCPs are primary data collectors; therefore, they need to be supported in terms of training, mentoring and resources to improve their interest, commitment, competencies and confidence in data management.

### 8.5.2 Facility managers

Evidence from the study identified a need for managers to support HCPs in generating quality data. Managers should share and improve access to routine health information tools and procedures among all staff members. They should involve HCPs in decision-making and problem-solving by using the available information. Managers should strengthen the

information culture by creating a suitable environment or platform that will encourage sharing information and open participation in problem-solving and decision-making by all staff members. The staff members should feel that they have an essential role in improving health care services, and their sentiments and judgements are essential.

### 8.5.3 Health Information Management (HIM) directorate

The HIM managers and officers are the custodians of the RHIS; therefore, they need to provide sufficient support to all health care facilities. They should offer data quality assurance mechanisms, including supportive supervision, data quality assessments, and performance reviews in a scheduled and consistent manner (preferably quarterly as indicted in the strategies). Supportive supervision should be aimed at improving the culture of information use at the facility level.

### 8.5.4 Training managers

The study reflected the need for training on the RHIS, specifically for HCPs and facility managers. The training should address all the competencies required for effective data management. Training providers should seek resource support for training by collaborating with NGOs and higher education institutions. These partners could offer short professional development courses in HIM. The training should be aimed at improving the culture of information use at the facility level.

### 8.5.5 Reproductive health programme managers

The reproductive health programme managers should seek the support of district clinical specialist teams to mentor and support HCPs in terms of specialised skills for reproductive health services. The district clinical specialist teams comprises a team of health specialists, including an advanced midwife, paediatrician, paediatric nurse, obstetrician, family physician, anaesthetist, and a primary health care nurse. One of their responsibilities is to offer supportive supervision on health programmes related to maternal and child health (Oboirien, Harris, Goudge & Eyles 2018:2). As part of their supportive supervision role in the reproductive health programme, programme managers should support all HCPs, visit

facilities and mentor HCPs on specialised skills required for improving the service (e.g. the insertion of the IUCD).

### 8.5.6 Non-governmental organisations

As organisations supporting the department of health, the study suggests that NGOs collaborate with the department of health in terms of training and mentoring. Organisations like Health Information System Program South Africa (HISP-SA) could make their data management courses more accessible for all HCPs and managers. In addition to training, the organisation could offer support in mentoring HCPs and managers on data quality and the use of information. It is envisaged that a short training programme and mentoring on data management could improve the system's performance.

### 8.5.7 Higher education and training institutions

There is a need for colleges and universities to prepare HCPs for data management tasks by including RHIS in their modules. This will enable the HCPs to understand the importance of RHIS and view data management as part of their health care responsibilities. In that manner, they will commit to data management as soon as they enter the practice area.

### 8.5.8 Department of health

Evidence from the study suggests that the department of health should review the technical aspects of the system, specifically the data collection tool and the CYPR indicator. The tool should be simple to prevent data collection errors, while the calculation of the CYPR indicator should accurately reflect the reproductive health programme's performance. Second, the department should ensure that all facilities have the necessary human and technical resources for data management. The NDoH should review the DHMIS policy to mandate the reporting of reproductive health services to the respective district, mainly on contraceptive services.

The department should strengthen the information use culture at all levels of the system. They could start by ensuring that all stakeholders are capacitated in the culture of information use, in terms of skills and resources. All stakeholders, specifically at the facility,

district and provincial level, should receive feedback on the data being generated and be involved in decision-making and setting targets. All stakeholders should feel that they have an essential role to play in improving health care services and their views and opinions are appreciated.

The researcher further recommends that the strategies are first implemented in the Tshwane district. If they yield the expected outcomes, they can be adapted to the rest of Gauteng and other provinces in South Africa. All stakeholders should be consulted and form part of the implementation plan. A monitoring system should be in place to assess the effectiveness of the strategies in improving the performance of RHIS in managing reproductive health information.

### 8.5.9 Further research

There is a need to identify the intensity of the effect of behavioural, technical and organisational determinants on the performance of the RHIS so that more appropriate remedial actions can be implemented. Therefore, further research on the following aspects is recommended:

- Explore HCPs' experiences in using the RHIS to manage reproductive health data.
- Conduct a correlation study to assess the association between the quality of reproductive health data and behavioural, technical and organisational determinants of the RHIS.
- Conduct a correlation study to assess the association between the use of reproductive information and behavioural, technical and organisational determinants of RHIS.
- Since the study developed the strategies to address the identified gaps in reproductive health data management, further research could be conducted to evaluate the effectiveness of the strategies.

## 8.6 LIMITATIONS OF THE STUDY

A few limitations were noted. The study assessed the quality and use of information, and identified factors (behavioural, technical and organisational) influencing the performance of the RHIS in managing reproductive health data only. The study did not assess the degree of association between the factors and the performance of the system. Since the study was

conducted in one district, the findings could only be generalised to districts with the same context. The effect of this limitation was reduced by involving stakeholders from different levels of management (facility, district, provincial and national) in validating the strategies. In addition, the use of advanced statistical strategies strengthened the findings to overcome any possible limitations.

## 8.7 CONCLUSION

The researcher believes that the study's findings presented answers on the data management processes (data collection, quality check, analysis, presentation) and facility managers' role in data management, thus providing an understanding of the performance of the RHIS in managing routine reproductive health information. The study revealed that produced data did not measure up to the required quality standards; the challenge with the quality of data was mainly related to reports' accuracy and timeliness, indicating a high probability of information not being effectively used to monitor reproductive health service's performance. In addition, the HCPs showed less than ideal levels of understanding, confidence and competence in reproductive health data management processes. Motivation manifested as interest and commitment to data management, was also found to be low.

Various factors appeared to have had an impact on the participants, such as insufficient supervisory visits, inadequate access to resources (SOP), and lack of training on the RHIS. Furthermore, the data quality was compromised by the complex design of the data collection tool and poor culture of information use at the facility level. Managers performed their data management roles by ensuring good quality data and information to improve health services. They monitored the data collection process, conducted data quality checks, and capacitated HCPs on the data management task. In some instances, these capacity-building initiatives did not achieve the desired outcomes, as indicated earlier. Much as managers claimed they involved HCPs in decision-making and problem-solving, this was not evident in the confidence and competence levels observed. The weaknesses identified were elaborated on in the proposed strategies.

Managers reported that the information generated was used in reporting on the service provided to the next level, providing feedback to the HCPs, monitoring the utilisation rate of contraceptives, ensuring sufficient resources, budgeting and supply chain management,

and comparing pregnancy rates against contraceptive use. Decisions to mobilise and educate the community about the availability of LARCs and reduce waiting times at the facility level were made to improve the reproductive health service. However, the study contends that much could still be done regarding the use of information and managers could benefit from support to improve their understanding of the CYPR calculation and broader uses. The study recognises the significance of the CYPR in evaluating the programme's performance and assumes that due to its limitations and complexities, it cannot be viewed as the sole measure of the reproductive service.

Facility managers felt their role was pivotal; they played a vital part in using reproductive health information to measure the programme's activities, and carried out their role to the best of their ability with the resources available to them. The theoretical framework's core concepts provided sufficient direction on issues to focus on, and the reciprocity of technical, behavioural and organisational determinants was noted and generated great insights into the performance of the RHIS. There was insufficient evidence to suggest that the RHIS is not an ideal HIS. However, that was not the main focus of this study; the focus was on routine data being generated using the RHIS and the transformation of that data into useful information.

The study assumes that the developed strategies would address the factors that influence data management processes to improve the RHIS's performance in managing routine reproductive health information. This would have a positive effect on the management of the health service.

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# ANNEXURE A: REQUEST FOR SITE PERMISSION

153 Boundary Road
Karenpark
0182
17 May 2017

Tshwane Research Committee
The Fields Building,
427 Hilda Street
Hatfield
Pretoria
0028

I, Sophy Mogatlogedi Moloko request to conduct a research at your institutions. The research project is titled "**Evaluating performance of routine health information system for reproductive health in Tshwane**". The research is conducted as a requisite to complete my Doctorate in Literature and Philosophy at the University of South Africa under the supervision and mentorship of Dr MM Ramukumba.

The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection) in Tshwane district with special focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve system capacity to produce quality data and to support use of information for evidence based decisions.

In order to achieve the purpose, the following objectives are proposed:

- Determine how RHIS is used to produce reliable and quality reproductive health data.
- Sub-objectives:
    - To explore healthcare providers' understanding of reproductive health data management.
    - To determine healthcare providers' perceived confidence in performing reproductive health information management (HIM) tasks.
    - To examine health care providers' views regarding the organisational factors influencing reproductive health data management tasks

- To establish health care providers' views regarding the usability of the data collection tool.

- To assess the quality of reproductive health data at the facility.
- To explore managers' role in the management of reproductive health information.
- To assess the use of reproductive health information in decision making at the facility.
- To identify barriers and opportunities for effective data management processes.
- To develop strategies for improving reproductive health data management

For these objectives to be achieved, explanatory sequential design will be utilized. First will be collection and analysis of quantitative data followed by collection and analysis of qualitative data.

The target population for the study is health care practitioners, facilities managers and records.

You are kindly requested to grant permission for the study to be conducted in your facilities. All information collected will be treated with the strictest confidence.

Any enquiries with regard to the research may be made to Ms Moloko at

Cell : 082 442 5326
E-mail: smmoloko@gmail.com

Or

Prof MM Ramukumba (Supervisor): ramukmm@unisa.ac.za
072 630 2504

Regards

_____

Ms Sophy M Moloko

# ANNEXURE B: CONSENT FORM FOR HEALTH CARE PROVIDERS AND FACILITY MANAGERS

**What is the research about?**

This is a research being conducted by Sophy Mogatlogedi Moloko as part of Doctorate in Literature and Philosophy at the University of South Africa (UNISA). You are invited to participate in this study in your capacity as a health care provider or a facility manager at Tshwane district. The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection) in Tshwane district with special focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve system capacity to produce quality data and to support use of information for evidence based decisions.

**What will I be asked to do if I agree to participate?**

As a health care providers, you will be requested to complete a questionnaire consisting of questions related to the study. The questionnaire will not take more than 30 min to complete. The answers will be based on your knowledge, views and experience. They don't require any prior preparation.

As a Facility managers, you will be requested to answer questions related to the study that will be asked by the researcher. The questions will not take more than one hour. The answers will be based on your experience. They don't require any prior preparation.

**What are the risks of this research?**

The study procedures involve no foreseeable risks to you. You have the right to refuse to answer any question that makes you feel uncomfortable. However if you feel that you psychological affected, please feel free to talk to me at any time.

**What are the benefits of this research?**

This research will not have any monetary benefit to you as a participant. However, your views and experiences will assist the researcher to make recommendation and develop strategies for improving reproductive health data quality and use of information for decision making.

**Do I have to be in this research and may I stop participating at any time?**

Your participation in this study is voluntary. You have the right to withdraw from the study at any stage should you decide to participate, and you will not be penalised. All information provided will be treated in the strictest confidence and your name will not be reflected anywhere.

**What if I have questions?**

If you have any questions about the study itself, please contact me (Sophy Mogatlogedi Moloko) on Telephone: 082 442 5326 or on Email: 46902546@mylife.unisa.ac.za or smmoloko@gmail.com.

This research has been approved by the Department of Health Studies' Ethics Committees, University of South Africa. Should you wish to report any problems you have experienced in relation to the study, please contact Prof Margaret Ramukumba, the Research Supervisor on Tel number: 072 6302 504 or E-mail: ramukmm@unisa.ac.za or Prof J Maritz, the Head of the Department of Health Studies' Ethics Committees on Tel number: 082 7888 703 or E-mail: maritje@unisa.ac.za

**Declaration by the participant**

I ..... voluntarily consent to participate in the above-mentioned research project. The background, purpose, risks and benefits of the study have been explained to me. I also understand that I may withdraw from the study at any time without consequences. I know that my participation in the study will be acknowledged, although my identity and the identity of health facility will be withheld.

I agree to be audiotaped during my participation in this study. I understand that my participation in the study is voluntary. **(NB: only applicable to facility managers)**

……. ……..

Participants' signature Date

..... .....

Witness Date

**Declaration by investigator**

I, **Sophy Mogatlogedi Moloko** declare that:

- I explained the information in this document.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

…… _____

**Signature of investigator** **Date**

# ANNEXURE C: RESEARCH QUESTIONNAIRE PHASE 1

**Dear Participants**

You are invited to participate in the study on evaluation of routine health information system with specific focus on reproductive health information.

The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection) in Tshwane district with special focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve system capacity to produce quality data and to support use of information for evidence based decisions.

Your participation in this study is voluntary and you have the right to withdraw from the study at any stage. All information provided will be treated in the strictest confidence and your name will not be reflected anywhere in the questionnaire.

If you decide to participate, the questionnaire should take thirty minutes to complete. Please answer the questions in the space provided. Answer the questions as honestly as possible.

For further information about this study, you can ask me now or any time. My telephone number is 082 442 5326 and e-mail is 46902546@mylife.unisa.ac.za. Any questions regarding the ethical aspects of the study can be directed to my supervisor at UNISA, Dr Margaret Ramukumba, during office hours at telephone number 012 4296719 or e-mail: ramukmm@unisa.ac.za.

The researcher appreciates your time in completing this questionnaire as well as your contribution to the successful completion of the study. A copy of my completed research report can be made available to you upon request.

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Researcher: MS S. M. Moloko

Supervisor: PROF M Ramukumba

**Study title: EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**

Dear Participant Questionnaire number_____

Guide to Answering the Questions

- Read the statement or question carefully to ensure understanding
- Kindly answer all questions about information generation process by inserting an X in front of participants response for each question in the column labelled “CODE” and write answers or comments in the spaces provided.

| **Section A : General Information** | | | |
|---|---|---|---|
| **Socio-demographic Information** | | | |
| Facility code: _____ | | | |
| **No** | **Question** | **Response** | **Code** |
| 01 | What is your gender | Male | 1 |
| | | Female | 2 |
| 02 | In which age category do you fall | 20-29 | 1 |
| | | 30-39 | 2 |
| | | 40-49 | 3 |
| | | 50-59 | 4 |
| | | 60-69 | 5 |
| 03 | What is your highest level of education | Master Degree | 1 |
| | | Bachelor Degree | 2 |
| | | Diploma | 3 |
| | | Certificate | 4 |
| 04 | What is your working position in the health facility | Medical Officer | 1 |
| | | Professional Nurse | 2 |
| | | Enrolled Nurse | 3 |
| | | Other, Please specify | 4 |
| 05 | How long have you being employed in the position stated above | 0-4 years | 1 |
| | | 5-9 years | 2 |
| | | 10-14 years | 3 |
| | | 15 – 20 years | 4 |
| | | 20 years and above | 5 |

| Training | | | |
|---|---|---|---|
| **No** | **Question** | **Response/code** | |
| 06 | Did you attend the 3 or 5 days training on RHIS/DHIS? | Yes | 2 |
| | | No | 2 |
| 07 | Did you attend a 5 days training on reproductive health (contraceptive / family planning) | Yes | 1 |
| | | No | 2 |

| **Section B: The questions in this section intend to evaluate the health care providers' understanding of reproductive health data management** | | | | | |
|---|---|---|---|---|---|
| **The questions in this part intend to establish health care providers' understanding of the recording of reproductive health data elements.** | | | | | |
| **No** | **Question** | **Responses/code** | | | |
| | At which age group do you record the following reproductive health services on RHIS/DHIS tool? | 12 years and above | 15 years and above | Between 15 and 49 years | All age groups |
| 08 | Oral pill cycle issued to a women. | 1 | 2 | 3 | 4 |
| 09 | Medroxyprogesterone injection administered to a woman. | 1 | 2 | 3 | 4 |
| 10 | Norethisterone enanthate injection administered to a woman. | 1 | 2 | 3 | 4 |
| 11 | Sub-dermal implant inserted to women. | 1 | 2 | 3 | 4 |
| 12 | IUD are recorded on RHIS/DHIS when administered or inserted to a woman. | 1 | 2 | 3 | 4 |
| 13 | Sterilisation performed on a man or women. | 1 | 2 | 3 | 4 |
| 14 | Male condoms distributed. | 1 | 2 | 3 | 4 |
| 15 | Female condoms distributed. | 1 | 2 | 3 | 4 |

| **Questions in this part intend to examine health care providers' understanding of facility reporting requirements.** | | | |
|---|---|---|---|
| **No** | **Questions** | **Response** | **Code** |
| 16 | How often does the facility send reproductive health data to the district office? | Weekly | 1 |
| | | Monthly | 2 |
| | | Quarterly | 3 |
| | | Biannually | 4 |
| 17 | At what date of the month is the data sent to the district office? | On the 26th | 1 |
| | | On the 3rd | 2 |
| | | On the 7th | 3 |
| | | On the 15th | 4 |

**Section C: Statements in this section intend to evaluate health care providers' perceived confidence in performing reproductive health information management tasks**

High confidence indicates that person could perform the task, while low confidence means room for improvement or training. I am interested in knowing how confident you feel in performing RHIS/DHIS-related tasks. Please be frank and rate your confidence honestly.

Rate your confidence for each situation with a percentage from the following scale

0 1 2 3 4 5 6 7 8 9 10

Zero being no confidence while10 is reflecting highest confidence level.

Low confidence ⟶ High confidence

| **No** | **Statements** | **Response/code** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | I can collect reproductive health data correctly | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 19 | I can check reproductive health data accuracy | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 20 | I can calculate couple year protection rate correctly | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 21 | I can plot data by months or years | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 22 | I can compute trends from bar charts | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 23 | I can explain findings & their implications | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 24 | I can use data for identifying gaps and setting targets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 25 | I can use data for making various types of decisions and providing feedback | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Section D: Health care providers' views regarding organisational factors that influence data management tasks**

**Questions in this part intend to examine the healthcare providers' view regarding the practices of the use of reproductive health information**

| No | Statements | Responses/Code | | | | |
|---|---|---|---|---|---|---|
| | Indicate your views regarding the following practices: | Strongly Disagree | Disagree | Neither Disagree nor Agree | Agree | Strongly Agree |
| 26 | Staff receive reproductive health service performance feedback on monthly basis | 1 | 2 | 3 | 4 | 5 |
| 27 | Staff receive reproductive health service performance feedback on quarterly basis | 1 | 2 | 3 | 4 | 5 |
| 28 | Feedback is always supported by evidence from the collected data | 1 | 2 | 3 | 4 | 5 |
| 29 | Staff is allowed to make decisions based on the feedback received | 1 | 2 | 3 | 4 | 5 |
| 30 | Data is gathered from the staff to find root cause of the problem | 1 | 2 | 3 | 4 | 5 |
| 31 | Staff is involved in selecting interventions for a given problem. | 1 | 2 | 3 | 4 | 5 |
| 32 | Staff is involved in evaluating the achievements of targets | 1 | 2 | 3 | 4 | 5 |

| Questions in this part intend to examine health care providers' views regarding the availability of resources | | | | | | |
|---|---|---|---|---|---|---|
| **No.** | **Statement** | **Responses/Code** | | | | |
| | The following resources are always available to users for reference: | Strongly Disagree | Disagree | Neither Disagree nor Agree | Agree | Strongly Agree |
| 33 | District health management information system (DHMIS standard operating procedures | 1 | 2 | 3 | 4 | 5 |
| 34 | District health management information system (DHMIS) Policy | 1 | 2 | 3 | 4 | 5 |
| 35 | The latest Tshwane district health plan (DHP) for reproductive health plan and targets. | 1 | 2 | 3 | 4 | 5 |
| 36 | The latest District health Barometer to assess district reproductive health performance | 1 | 2 | 3 | 4 | 5 |
| 37 | The latest facility operational plan indicating facility reproductive health plans and targets. | 1 | 2 | 3 | 4 | 5 |
| 38 | Latest National Indicator Data Set definitions for the current data elements and indicator definitions. | 1 | 2 | 3 | 4 | 5 |
| 39 | Health care providers are sufficient for data collection | 1 | 2 | 3 | 4 | 5 |
| 40 | Data capturers are adequate for data capturing | 1 | 2 | 3 | 4 | 5 |
| 41 | Computers are sufficient for capturing data | 1 | 2 | 3 | 4 | 5 |
| 42 | The MDS tool is always available for data collection | 1 | 2 | 3 | 4 | 5 |

| Questions in this part intend to examine health care providers' views the support and supervision | | | | | | |
|---|---|---|---|---|---|---|
| **No** | **Statements** | **Responses/Code** | | | | |
| | Indicate your views regarding the following statements: | Strongly Disagree | Disagree | Neither Disagree nor Agree | Agree | Strongly Agree |
| 43 | Health information management (HIM) officers conduct supervisory facility visits activities at least once per quarter. | 1 | 2 | 3 | 4 | 5 |
| 44 | HIM officer check reproductive health data quality during the visit | 1 | 2 | 3 | 4 | 5 |
| 45 | HIM officer discusses the performance of | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | reproductive health program based on RHIS/DHIS data during the visit to the facility. | | | | | |
| 46 | HIM officer gives you an opportunity to discuss your health information challenges during the visit. | 1 | 2 | 3 | 4 | 5 |
| 47 | HIM officer conduct on the spot teaching/training when necessary during the visit. | 1 | 2 | 3 | 4 | 5 |
| 48 | HIM officer send report/feedback on the last supervisory visit | 1 | 2 | 3 | 4 | 5 |

| **Section E: Statements in this section intend to establish health care providers' views regarding the usability of the data collection tool.** | | | | | | |
|---|---|---|---|---|---|---|
| **No** | **Statement** | **Responses/Code** | | | | |
| | Please comment about the efficiency of the Minimum Data Set (MDS) tool in collecting reproductive health data. | Strongly Disagree | Disagree | Neither Disagree nor Agree | Agree | Strongly Agree |
| 49 | The MDS tool is easy to use | 1 | 2 | 3 | 4 | 5 |
| 50 | The MDS tool is unnecessarily complex | 1 | 2 | 3 | 4 | 5 |
| 51 | The MDS tool takes a long time to complete | 1 | 2 | 3 | 4 | 5 |
| 52 | The MDS tool is well integrated with the health care providers' workflow | 1 | 2 | 3 | 4 | 5 |
| | | | | | | |
| | Please comment about the effectiveness of the Minimum Data Set (MDS) tool in collecting reproductive health data | Strongly Disagree | Disagree | Neither Disagree nor Agree | Agree | Strongly Agree |
| 53 | The MDS tool has enough fields for recording reproductive health data | 1 | 2 | 3 | 4 | 5 |
| 54 | It is easy to enter data on the wrong block/field on the MDS tool | 1 | 2 | 3 | 4 | 5 |
| 55 | It is easy to aggregate data incorrectly on the MDS tool | 1 | 2 | 3 | 4 | 5 |
| 56 | Data collected on the MDS always offer a true reflection of reproductive health activities | 1 | 2 | 3 | 4 | 5 |

**THANK YOU**

(Questionnaire adapted and modified from Agil, Lippeveld and Hozumi (2009) and MEASURE Evaluation)

**Permission was sought from MEASURE Evaluation.**

# ANNEXURE D: CHECKLIST DATA QUALITY EVALUATION

This is a documentary review of facility generated monthly reports, DHIS software generated reports and management directives. The focus is on evaluating the data availability, accuracy, completeness and timeliness.

| **Date of Evaluation:**_____ | **Name of the Evaluator:**_____ | **Facility Code-** _____ |
|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | **Procedure manual** | | | | |
| 101 | Is the DHMIS Standard Operating Procedure for facility level available in the facility | Yes available | 1 | No | 2 |
| | **Data availability** | | | | |
| 102 | Indicate the availability of the following facility generated monthly reports | | | | |
| 103 | July 2017 monthly report | Yes available | 1 | No | 2 |
| 104 | August 2017 monthly report | Yes available | 1 | No | 2 |
| 105 | September 2017 monthly report | Yes available | 1 | No | 2 |
| 106 | October 2017 monthly report | Yes available | 1 | No | 2 |
| 107 | November 2017 monthly report | Yes available | 1 | No | 2 |
| 108 | December2017 monthly report | Yes available | 1 | No | 2 |

**Data accuracy check**

Record figures of following data elements from the facility generated monthly report and from DHIS software at the district office.

| | Data element | July 2017 | | Aug 2017 | | Sept 2017 | | Oct 2017 | | Nov 2017 | | Dec 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | # facility report | # DHIS Software | # facility report | # DHIS Software | # facility report | # DHIS Software | # facility report | # DHIS Software | # facility report | # DHIS Software | # facility report | # DHIS Software |
| 109 | Oral pill cycle | | | | | | | | | | | | |
| 110 | Norethisterone enanthate injection | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 111 | Medroxyprogesterone injection | | | | | | | | | | | | |
| 112 | IUD inserted | | | | | | | | | | | | |
| 113 | Subdermal Implant inserted | | | | | | | | | | | | |
| 114 | Male condom distributed | | | | | | | | | | | | |
| 115 | Female condom distributed | | | | | | | | | | | | |
| 116 | Male sterilization performed | | | | | | | | | | | | |
| 117 | Female sterilization performed | | | | | | | | | | | | |
| | Compare figures from the facility generated report with the ones from DHIS software generate reports at the district office as recorded above. Indicate whether they are same or different. | | | | | | | | | | | | |
| | | July 2017 | | Aug 2017 | | Sept 2017 | | Oct 2017 | | Nov 2017 | | Dec 2017 | |
| | | Same | Different | Same | Different | Same | Different | Same | Different | Same | Different | Same | Different |
| 109 | Oral pill cycle | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 110 | Norethisterone enanthate injection | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 111 | Medroxyprogesterone injection | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 112 | IUD inserted | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 113 | Subdermal Implant inserted | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 114 | Male condom distributed | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 115 | Female condom distributed | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 116 | Male sterilization performed | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 117 | Female sterilization performed | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Q5 | Evidence of directives from management or district office in the last three months to highlight the following challenges: | | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 118 | Accuracy of data | Yes available | 1 | No | 2 |
| 119 | Incompleteness of the monthly report form | Yes available | 1 | No | 2 |
| 120 | Timely submission of reports | Yes available | 1 | No | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | **Data Completeness** | | | | |
| Q6 | Count the number of reproductive health data items that are supposed to be filled in by this facility but left blank without indicating "0" from July to Dec 2017. | | | | |
| | | One | Two | Three | More than three |
| 121 | July 2017 | 1 | 2 | 3 | 4 |
| 122 | August 2017 | 1 | 2 | 3 | 4 |
| 123 | September 2017 | 1 | 2 | 3 | 4 |
| 124 | October 2017 | 1 | 2 | 3 | 4 |
| 125 | November 2017 | 1 | 2 | 3 | 4 |
| 126 | December 2017 | 1 | 2 | 3 | 4 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Data Timeliness** | | | | | | | | | | | | | |
| | | July 2017 | | Aug 2017 | | Sept 2017 | | Oct 2017 | | Nov 2017 | | Dec 2017 | |
| Q7 | Evidence of facility reporting on its monthly performance to the district office before the 7th of every month from July to Dec 2017 | Yes | 1 | Yes | 1 | Yes | 1 | Yes | 1 | Yes | 1 | Yes | 1 |
| | | No | 2 | No | 2 | No | 2 | No | 2 | No | 2 | No | 2 |
| Q8 If no to Q7, how many times did the facility miss the reporting date (report after the 7th) | | | | | | | | Once | | | | | 1 |
| | | | | | | | | Twice | | | | | 2 |

| | | |
|---|---|---|
| | Thrice | 3 |
| | More than thrice | 4 |

(Check list adapted and modified from Agil, Lippeveld and Hozumi (2009) and MEASURE Evaluation)

# ANNEXURE E: PERMISSION TO PRISM TOOLS

153 Boundary Road
Karenpark
0182
06 October 2017

MEASURE Evaluation SIFSA
138 Muckleneuk Street
Nieuw Muckleneuk
Pretoria
0181

**RE: PERMISSION TO ADOPT PERFOMANCE OF ROUTINE INFORMATION SYSTEM MANAGEMENT (PRISM) TOOLS**

I, Sophy Mogatlogedi Moloko hereby request to utilize the PRISM tools developed by Agil et all (2009). I am student at UNISA busy with my doctoral studies (DLitt et Phil). My study is on Evaluation of routine health information system in managing reproductive health data in Tshwane district.

The purpose of the study is to evaluate the use of District Health Information System (DHIS) to monitor the performance of the reproductive health service in Tshwane district, with a view of identifying strengths and weaknesses of the system. Ultimately developing strategies for improvement. The tools will be utilized for collecting data from health care facilities and the district health information management offices.

Your permission will be highly appreciated.

Any enquiries with regard to the research may be made at

Regards

**Sophy M Moloko**
**082 442 5326**

Gmail sophy moloko <smmoloko@gmail.com>

# Permission to utilise PRISM tools

**Anzel Schonfeldt** <anzel_schonfeldt@za.jsi.com> Tue, Feb 21, 2017 at 12:36 PM
To: sophy moloko <smmoloko@gmail.com>

Dear Sophy

Congratulations on your PhD studies. You are more than welcome to use or adapt the PRISM tool, as long as MEASURE Evaluation is properly referenced as the originator of the tool.

We wish you all the best in your academic endeavours

Kind regards

Anzel Schonfeldt

Resident Technical Advisor

MEASURE Evaluation SIFSA

[Quoted text hidden]

# ANNEXURE F: THE INTERVIEW GUIDE/SCHEDULE

**Interview schedule for facility managers**

- To explore facility managers' role in reproductive health data management
- To describe facility managers' views regarding the quality of reproductive health data
- To assess the use of reproductive health information in decision making at the facility.
- To explore supportive measures for ensuring data quality and use of information.
- To identify opportunities and barriers for effective data management processes

## BIOGRAPHIC DATA

1. What is your highest nursing qualification? _____
2. What is your position in the facility/organisation_____
3. How many years of nursing experience in the position do you have? _____
4. How old are you? _____
5. Gender_____

## INTERVIEW QUESTIONS

1. Please describe your specific role in health information management system.

Probing:

- Please explain your roles and responsibilities in reproductive health data management

2. What are your views regarding the status of reproductive heath data produced by the RHIS/DHIS currently?
3. How are the staff members supported to produce good quality reproductive health data?

- Explain measures in place for supporting staff members to ensure production of good quality reproductive health data.

4. Please explain your specific role on the use of reproductive health information to make evidence based decisions

5. How is the reproductive health information used for decision making?

6. How do you ensure that reproductive health information is used for decision making?

Probing

- Explain supportive measure in place to ensure that reproductive health information is used for decision making?

7. What measures/strategies do you use to develop the information culture in the facilities?

8. Explain the barriers/challenges to the production of relevant, reliable and quality reproductive health data

Probing

- Explain any challenges to production of relevant, reliable and accurate reproductive health data?

9. What are the opportunities for improvement?

- What do you think could be done to improve the fuctioning of the system?

# ANNEXURE G: CONFIDENTIALITY BINDING FORM

## CONFIDENTIALITY CLAUSE

BETWEEN

**SOPHY MOGATLOGEDI MOLOKO (RESEARCHER)**

AND

_____ **(PARTICIPANT)**

**Research title**

**EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**

The research code of ethics mandate that confidentiality should be maintained throughout data collection, analysis and reporting of results

I, Ms S. M. Moloko commit myself to keep confidential of all information obtained during data collection, analysis and reporting of the qualitative data for the above stated study.

Ms S.M. Moloko

Date_____

# ANNEXURE H: ETHICAL CLEARANCE

UNISA university of south africa

**RESEARCH ETHICS COMMITTEE: DEPARTMENT OF HEALTH STUDIES**

**REC-012714-039 (NHERC)**

11 October 2017

**HSHDC/719/2017**
Sophy Mogatlogedi Moloko
Student 6690-254-6

Supervisor: Dr MM Ramukumba
Qualification: PhD
Joint Supervisor: -

Dear Sophy Mogatlogedi Moloko

**Decision: Ethics Approval**

**Name:** Sophy Mogatlogedi Moloko

**Proposal:** Evaluating performance of routine health information system for reproductive health in Tshwane

**Qualification:** **DPCHS04**

Thank you for the application for research ethics approval from the Research Ethics Committee: Department of Health Studies, for the above mentioned research. Final approval is granted from 11 October 2017 to 11 October 2022.

*The application was reviewed in compliance with the Unisa Policy on Research Ethics by the Research Ethics Committee: Department of Health Studies on 6 September 2017.*

*The proposed research may now commence with the proviso that:*

1) *The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*

2) *Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Research Ethics Review Committee, Department of Health Studies. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*

RECEIVED
2017 -10- 24
Executive Dean
College of Human Sciences

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

3) *The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*

4) *[Stipulate any reporting requirements if applicable].*

*Note:*
*The reference numbers [top middle and right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the Research Ethics Committee: Department of Health Studies.*

Kind regards,

Prof JE Maritz
CHAIRPERSON
maritje@unisa.ac.za

Prof MM Moleki
ACADEMIC CHAIRPERSON
molekmm@unisa.ac.za

Prof A Philipps
DEAN COLLEGE OF HUMAN SCIENCES

UNISA university of south africa

**COLLEGE OF HUMAN SCIENCES RESEARCH ETHICS REVIEW COMMITTEE**

01 December 2020

NHREC Registration # :
Rec-240816-052
CREC Reference # :
46902546_CREC_CHS_2020

Dear SM Moloko

**Decision:**
**Ethics Approval from 01 December 2020 to 31 November 2023**

---

**Principal Researcher(s) SM Moloko: (email: smmoloko@gmail.com)**

**Supervisor: Prof MM Ramukumba (email: mokholelana@gmail.com)**

**Title: Evaluating performance of routine health information system for reproductive health in Tshwane**

**Degree Purpose: PhD research project**

---

Thank you for the application for research ethics clearance by the Unisa College of Human Science Ethics Committee. Ethics approval is granted for three years.

The ***medium -Risk application*** *was* ***reviewed*** by College of Human Sciences Research Ethics Committee, on **24 November 2020** in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No fieldwork activities may continue after the expiry date **(31 November 2023).** Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

*Note:*

*The reference number **46902546** **_CREC_CHS_2020 should** be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours Sincerely,

Signature : 

Dr. K.J. Malesa
CHS Ethics Chairperson
Email: maleskj@unisa.ac.za
Tel: (012) 429 4780

Signature : PP 

Prof K. Masemola
Executive Dean : CHS
E-mail: masemk@unisa.ac.za
Tel: (012) 429 2298

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PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

# ANNEXURE I: LETTER TO EXPERTS

153 Boundary Road
Karenpark
0182
25 September 2020

**Attention**
Health information managers
Reproductive health programme managers
Human resource development managers

**INVITATION TO PARTICIPATE IN A STUDY ON EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**

I, Sophy Mogatlogedi Moloko, a PhD student (Student number 46902546) with University of South Africa (UNISA) invites you to participate in the study in your capacity as a Health Information Manager, Facility Manager, Reproductive Health Program Manager and Training manager/coordinator.

The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection rate) in Tshwane district with particular focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve capacity to produce quality data and use of information for evidence-based decisions.

Participation involves the validation of the proposed strategies to improve the performance of RHIS in managing reproductive health data. The strategies were developed based on literature and findings from quantitative and qualitative data collected from the health care providers, review of records and facility managers from health care facilities in Tshwane, Region three.

As a participant, you will be requested to attend a virtual meeting through the Microsoft Teams, where the researcher will be presenting the research findings and discussing the

proposed strategies with you. The date and time will be arranged through an email. The meeting will take approximately 120 minutes. Following the meeting, a questionnaire consisting of proposed strategies to improve the reproductive health data management will be sent to you to complete. The purpose of completing the questionnaires is to validate the strategies to ensure they are practical and valid. The validation process might involve two or more sessions (rounds) of validation. Meaning you might be expected to complete the questionnaire more than once.

No remuneration will be given for participating in the research study. There are no known risks associated with the study. Your participation in the study is voluntary, and you can withdraw from the study at any time when you do not feel comfortable.

The knowledge gained from the study would assist the health care facilities in Tshwane and in other districts with a similar context to improve the management of reproductive health information.

Your participation will be highly appreciated as your contributions will go a long way in improving the quality and the use of reproductive health information for decision making.

Yours Sincerely,

SM Moloko Signature
PhD student, UNISA

# ANNEXURE J: CONSENT FORM FOR EXPERTS

**What is the research about?**

This is a research being conducted by Sophy Mogatlogedi Moloko as part of PHD in Public Health at the University of South Africa (UNISA). You are invited to participate in this study in your capacity as a Health Information Manager, Facility Manager, Reproductive Health Program Manager and Training Coordinator. The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection) in Tshwane district with particular focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve capacity to produce quality data and use of information for evidence-based decisions.

The research has collected quantitative data from the health care providers at the facility level, assessed the quality of reproductive health data and collected qualitative data from the facility manager. Data has been analysed, and the quantitative and qualitative data have been integrated to develop the final findings.

**What will I be asked to do if I agree to participate?**

As a participant, you will be requested to attend a virtual meeting where the researcher will be presenting the research findings, followed by completion of a questionnaire consisting of proposed strategies to improve the reproductive health data management. The purpose of completing the questionnaires is to validate the strategies to ensure they are practical and valid. The validation process might involve one or two sessions (rounds) of validation. Meaning you might be expected to complete the questionnaire more than once. The strategies were developed based on literature and findings from quantitative and qualitative data collected from the health care providers and facility managers from health care facilities in Tshwane, Region three.

**What are the risks of this research?**

The study procedures involve no foreseeable risks to you. You have the right to refuse to answer any question that makes you feel uncomfortable. However, if you feel that you are psychological affected, please feel free to talk to me at any time.

**What are the benefits of this research?**

This research will not have any monetary benefit to you as a participant. However, your views and comments on the strategies will assist the researcher in generating strategies that would be valid and relevant for improving reproductive health data quality and use of information for decision making.

**Do I have to be in this research, and may I stop participating at any time?**

Your participation in this study is voluntary. You have the right to withdraw from the study at any stage should you decide to participate, and you will not be penalised. All information provided will be treated in the strictest confidence, and your name will not be reflected anywhere.

**What if I have questions?**

If you have any questions about the study itself, please contact me (Sophy Mogatlogedi Moloko) on Telephone: 082 442 5326 or on Email: 46902546@mylife.unisa.ac.za or smmoloko@gmail.com.

This research has been approved by the Department of Health Studies' Ethics Committees, University of South Africa and permission has been granted by the Gauteng Department of Health. The NHRD reference number is GP_201711_004. Should you wish to report any problems you have experienced concerning the study, please contact Prof Margaret Ramukumba, the Research Supervisor on Tel number: 072 6302 504 or Email: mokholelana@gmail.com or Prof J Maritz, the Head of the Department of Health Studies' Ethics Committees on Tel number: 082 7888 703 or Email: maritje@unisa.ac.za.

**Declaration by the participant**

I ..... voluntarily consent to participate in the research mentioned above. The background, purpose, risks and benefits of the study have been explained to me. I also understand that I may withdraw from the study at any time without consequences. I know that my participation in the study will be acknowledged, although my identity will be withheld.

……. ……..

Participants' signature Date

..... .....

Witness Date

**Declaration by investigator**

I, **Sophy Mogatlogedi Moloko,** declare that:

- I explained the information in this document.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above.
- I did/did not use an interpreter.

…… _____

**Signature of investigator** **Date**

# ANNEXURE K: QUESTIONNAIRE VALIDATION OF STRATEGIES

**Dear Participants**

You are invited to participate in the study on the evaluation of routine health information system with a specific focus on reproductive health information.

The purpose of the study is to evaluate the performance of the RHIS in generating quality reproductive health information (couple year protection) in Tshwane district with special focus on factors involved in data management processes. The ultimate aim is to develop strategies to improve the capacity to produce quality data and to support the use of information for evidence based decisions. As a health information manager, training coordinator, program manager and facility manager, you are requested to validate the proposed strategies.

Your participation in this study is voluntary and you have the right to withdraw from the study at any stage. All information provided will be treated in the strictest confidence and your name will not be reflected anywhere in the questionnaire. If you decide to participate, Please answer the questions in the space provided. Answer the questions as honestly as possible.

For further information about this study, you can ask me at any time. My telephone number is 082 442 5326 and e-mail is 46902546@mylife.unisa.ac.za. Any questions regarding the ethical aspects of the study can be directed to my supervisor at UNISA, Prof Margaret Ramukumba, during office hours at telephone number 012 4296719 or e-mail: mokholelana@gmail.com.

The researcher appreciates your time in completing this questionnaire as well as your contribution to the successful completion of the study. A copy of my completed research report can be made available to you upon request.

---

Researcher: Ms S. M. Moloko

Supervisor: Prof M Ramukumba

**Study title: EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE**

Dear Participant

Guide to Answering the Questions

- Read the statement or question carefully to ensure understanding
- Kindly answer all socio-demographic questions and all questions about your level of agreement with each statement about each strategy by inserting an X the column for response options.
- Write comments about each strategy in the spaces provided.

| **Section A : General Information** | | | |
|---|---|---|---|
| **Socio-demographic Information** | | | |
| **No** | **Question** | **Option** | **Response** |
| 1 | What is your gender | Male | 1 |
| | | Female | 2 |
| 2 | In which age category do you fall | 20-29 | 1 |
| | | 30-39 | 2 |
| | | 40-49 | 3 |
| | | 50-59 | 4 |
| | | 60-69 | 5 |

| | | | |
|---|---|---|---|
| 3 | What is your highest level of education | Doctoral Degree | 1 |
| | | Master Degree | 2 |
| | | Bachelor Degree | 3 |
| | | Diploma | 4 |
| | | Higher Certificate | 5 |
| 4 | Please indicate your organisation/department | National Department of Health | 1 |
| | | Provincial Health Office | 2 |
| | | District Health Office | 3 |
| | | City of Tshwane Metropolitan Municipality | 4 |
| | | Non-Governmental Organization (NGO) | 5 |
| 5 | Please indicate your position in your organisation/department | | |
| 6 | How long have you been employed in the position stated above | | |

## SECTION B: PROPOSED STRATEGIES FOR IMPROVING THE USE OF RHIS IN MANAGING REPRODUCTIVE HEALTH DATA

- Indicate your level of agreement or disagreement with the following statement by below by inserting an X in the column labelled either 1, 2, 3 or 4 using the indicated scale

| **Section B: The questions in this section intend to determine your level of agreement or disagreement with the proposed strategies for improving the use of RHIS in managing reproductive health data** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Strategy no 1: Building capacity in data management competencies** | | | | | | | | |
| **Expected outcome: Improved competencies and confidence in performing health information management task** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 7 | Design health information system (HIS) educational program | 7.1 Review current health information management (HIM) processes to identify the required competencies for data management | National, Provincial and district HIM directorate | Annually | 1 | 2 | 3 | 4 |
| | | 7.2 Map the functions of each staff member related to HIM/RHIS | National, Provincial and district HIM directorate | Annually | 1 | 2 | 3 | 4 |
| | | 7.3 Design a HIMS training curriculum to address the identified HIMS competencies | Human resource development (HRD) unit/training units and National, Provincial and district HIM directorate | Annually | 1 | 2 | 3 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 7.4 The training curriculum for healthcare providers to should cover essential aspects of data management | District HRD unit/training units | Annually | 1 | 2 | 3 | 4 |
| | | 7.5 The training curriculum for the facility managers should cover the data management processes, including the use of information for managing the health care facility. | District HRD unit/training units | Annually | 1 | 2 | 3 | 4 |
| 8 | Ensure adequate resources for training | 8.1 Conduct personnel training needs assessment | Facility manager | Annually | 1 | 2 | 3 | 4 |
| | | 8.2 Establish a schedule and budget for training of HCPs and facility managers on data management | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.3 Mobilise training resources within the organisation through the identification of appropriate training facilitators. | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.4 Design a departmental training plan that will include a schedule for HIMS training | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 8.5 Design a departmental training program to address health data management competencies | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.6 Identify significant stakeholders for training collaboration | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.7 Collaborate with HETIs to ensure that they incorporate HIMS in the curriculum for health care providers' basic training | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.8 Conduct peer consultations with NGOs and HITSs on support for electronic learning platform | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.9 Facility managers and HCPs to be trained on HIM/RHIS | District HRD unit/ training units and NGOs supporting the department | Quarterly | 1 | 2 | 3 | 4 |
| | | 8.10 Release at least one health care provider for each training to provide a learning opportunity for all HCPs | Facility managers | Quarterly | 1 | 2 | 3 | 4 |

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| | | 8.11 Develop the training database for monitoring the implementation of the training plan | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.12 Offer training updates whenever there are changes in the data management process | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 8.13 Design an in-service training plan on data quality issues and use of information | Facility Manager | Quarterly | 1 | 2 | 3 | 4 |
| 9 | Promote accountability and commitment to data management | 9.1 Include data management on employees performance appraisal system | District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 9.2 Design measure to enhance understanding of the purpose and criteria used for performance management | Facility manager | Annually | 1 | 2 | 3 | 4 |
| | | 9.3 Conduct the performance assessment according to the set criteria | Facility manager | Annually | 1 | 2 | 3 | 4 |
| | | 9.4 Develop a system of incentives for good performance | District Health Management | Annually | 1 | 2 | 3 | 4 |

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| | | (Improvements in data quality and use of information) | | | | | | |

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| **Strategy no 2: Ensure sufficient resource capacity for data management** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Adequate resource capacity for data management** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 10 | Ensure the availability of human resources for data management | 10.1 Compile an actual workload and facility normative guide | Facility manager | Annually | 1 | 2 | 3 | 4 |
| | | 10.2 Review the existing health workforce against the normative guides | District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 10.3 Identify areas with lower, or higher numbers of human resource per category | District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 10.4 Use the staffing norms to redistribute or recruit the required number of human resources per facility | District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 10.4 Develop strategies to promote staff retention and reduce staff turnover. | District Health Management | Annually | | | | |
| 11 | Ensure the availability of technical resources for | 11.1 Ensure that the budget for procuring data management resources is adequate | Provincial and District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 11.2 The budget should include the maintenance and service of the resources, e.g. software update | | | | | | |

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| | data management | 11.3 Provide facilities with sufficient computers for timely capturing of data | Provincial and District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 11.4 Ensure uninterrupted internet coverage and power supply for all facilities | Provincial and District Health Management | Annually | 1 | 2 | 3 | 4 |
| | | 11.5 Develop a contingency plan for procurement and supply of new data collection tools during the transition and changes | Provincial and District Health Management | Annually | 1 | 2 | 3 | 4 |

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| **Strategy no 3: Enhancing support for generating quality data** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Improved data quality of data** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 12 | Enhance data quality assurance practices | 12.1 The DHIMIS SOP and Policy to be a permanent agenda item on facility monthly meetings | Facility Manager | Monthly | 1 | 2 | 3 | 4 |
| | | 12.2 Conduct data quality assessment every month before submitting reports to the next level | Facility Manager and data champion | Monthly | 1 | 2 | 3 | 4 |
| | | 12.3 Conduct quarterly data quality review meetings to discuss data quality issues and plans to address them. | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 12.4 Develop a template for data quality improvement plan | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 12.5 Develop a template for data quality improvement plan | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 12.6 Develop a standardised procedure to monitor the implementation of the data quality improvement plan | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |

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| | | 12.7 Conduct data quality audits on an annual basis | National, provincial and district HIM directorate | Annually | 1 | 2 | 3 | 4 |
| 13 | Improving supportive supervision | 13.1 Develop the Standard Operating Procedure (SOP) for data management supportive supervision | National, provincial and district HIM directorate | Once and reviewed every two years | 1 | 2 | 3 | 4 |
| | | 13.2 Develop a schedule for quarterly health information supportive supervisory visits for each facility | District HIM directorate | Annually | 1 | 2 | 3 | 4 |
| | | 13.3 Conduct supportive supervisory visits using the standardised checklist. | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 13.4 Supportive visits to focus on assessing the quality of data (completeness, timeliness, accuracy) | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 13.5 Findings from supportive supervisory visits to be reviewed and acted upon to correct insufficiencies | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 13.6 Standardised supervision reports to be completed to track results and monitor trends | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |

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| | | 13.7 The report to be sent to the facilities to provide feedback on the outcome of the visit | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| | | 13.8 Report on the number of visits conducted to be sent to the next reporting level (higher authority) to ensure compliance | District HIM directorate | Quarterly | 1 | 2 | 3 | 4 |
| 14 | Improving the data collection process | 14.1 Improve the design of the data collection tool (PHC/MDS tool) by reducing the number of data elements on the tool provided | Provincial and district HIM directorate | Every two years | 1 | 2 | 3 | 4 |
| | | 14.2 Implement Web-Based data collection at the point of service | National, provincial and district HIM directorate | Immediately | 1 | 2 | 3 | 4 |

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| **Strategy no 4: Improving the culture of information use** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Improved culture of information use** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 15 | Improve the participation of data generators and data users in decision making | 15.1 Involve facility managers in program planning, especially when setting the target for the indicators (e.g. Couple Year Protection Rate) | District HIM directorate, Monitoring and evaluation and health programs | Annually | 1 | 2 | 3 | 4 |
| | | 15.2 Develop communication measures on the quality and performance of reproductive health data | District HIM directorate and facility managers | Monthly | 1 | 2 | 3 | 4 |
| | | 15.3 Develop measures to improve access to information | District HIM directorate and facility managers | Quarterly | 1 | 2 | 3 | 4 |
| | | 15.4 Involve the HCPs when developing and implementing the operational plan | Facility managers | Annually | 1 | 2 | 3 | 4 |
| | | 15.5 Create a plan for implementing a participatory management approach | Facility managers | Daily | 1 | 2 | 3 | 4 |

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| | | 15.6 Develop standardised plans for using weekly and monthly meetings as a platform to create information use culture | Facility managers | Weekly | 1 | 2 | 3 | 4 |
| | | 15.7 Modify composition of the performance review team to include data generators/HCPs and data capturers | District HIM directorate, Monitoring and evaluation, health program managers and facility managers | Quarterly | 1 | 2 | 3 | 4 |
| 16 | Improve the use of information at the facility level | 16.1 Develop plans for use of information to review performance of the CYPR | Facility managers | Monthly | 1 | 2 | 3 | 4 |
| | | 16.1.1 to compare the performance of the indicator among facilities in the district | Facility managers | Monthly | 1 | 2 | 3 | 4 |
| | | 16.1.2 to seek and share best practices for improving service delivery to clients | Facility managers | Monthly | 1 | 2 | 3 | 4 |
| | | 16.1.3 to inform essential management practices | Facility managers | Monthly | 1 | 2 | 3 | 4 |

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| **Strategy no 5: Simplify the CYPR indicator** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Simple and straightforward CYPR indicator** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 17 | Review the formula used for calculating the CYPR | 17.1 Review the use of conversion factors when calculating the CYPR so that it reflects an actual program performance | The National Department of Health | Immediately | 1 | 2 | 3 | 4 |
| | | 17.2 Review the formula used to calculate the CYPR indicator to make it simple | The National Department of Health | Immediately | 1 | 2 | 3 | 4 |

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| **Strategy no 6: Improving the performance of CYPR indicator** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Improved performance of CYPR indicator** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 18 | Improve skills for reproductive health service provision | 18.1 Conduct personnel training needs assessment for methods with low perfomance | Facility Manager | Annually, then review quarterly | 1 | 2 | 3 | 4 |
| | | 18.2 Establish a budget for training of HCPs and facility managers on the LARC | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.3 Establish a schedule for training of HCPs and facility managers on the LARC | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.4 Identify training facilitators with sufficient knowledge and skills on insertion and removal of the LARC, | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.5 Identify significant stakeholders for training collaboration | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.6 Provide reproductive health training to HCPs, mainly on the insertion and the removal of the LARC | District HRD unit/ training units | Quarterly | 1 | 2 | 3 | 4 |

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| | | 18.7 Provide support and mentoring post-training to enhance HCPs competence and confidence in the insertion and the removal of the LARC | District HRD unit/ training units and reproductive health program managers | Quarterly | 1 | 2 | 3 | 4 |
| | | 18.8 Develop a training database to document all training | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.9 Use data driven approaches to monitor the effectiveness of training | District HRD unit/ training units | Annually | 1 | 2 | 3 | 4 |
| | | 18.9 Provide training on updates in the provision of LARC | District HRD unit/ training units | When necessary | 1 | 2 | 3 | 4 |
| 19 | Improve the accuracy of CYPR | 19.1 Mandate the reporting of contraceptive service by all private practitioners to the district offices | National Department of Health HIM directorate | Immediately and monitor monthly | 1 | 2 | 3 | 4 |

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| **Strategy no 7: Establish measures to evaluate the performance of HIM/RHIS in managing health program data** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Expected outcome: Evaluate the performance of HIM/RHIS in managing health program data** | | | | | | | | |
| **No** | **Actions** | **Activities** | **Responsible unit/person** | **Time-frame** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| 20 | Design HIM evaluation approaches | 20.1 Develop a plan to evaluate the quality of data generated | District HIM directorate | Annually | 1 | 2 | 3 | 4 |
| | | 20.2 Conduct the evaluation of information use using a standardised tool | District HIM directorate | Annually | 1 | 2 | 3 | 4 |

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**THANK YOU FOR YOUR PARTICIPATION IN THE STUDY**

# ANNEXURE L: EDITING CERTIFICATE

Between the lines editing

Leatitia Romero
Professional Copy Editor, Translator and Proofreader
(BA HONS)

Cell: 083 236 4536
leatitiaromero@gmail.com
www.betweenthelinesediting.co.za

22 January 2021

To whom it may concern:

I hereby confirm that I have edited the thesis entitled: "EVALUATING PERFORMANCE OF ROUTINE HEALTH INFORMATION SYSTEM FOR REPRODUCTIVE HEALTH IN TSHWANE". Any amendments introduced by the author hereafter are not covered by this confirmation. The author ultimately decided whether to accept or decline any recommendations made by the editor, and it remains the author's responsibility at all times to confirm the accuracy and originality of the completed work.

Leatitia Romero

Affiliations

PEG: Professional Editors Group (ROM001)
EASA: English Academy of South Africa
SATI: South African Translators' Institute (1003002)
SfEP: Society for Editors and Proofreaders (15687)
REASA: Research Ethics Committee Association of Southern Africa (104)

# ANNEXURE M: PERMISSION LETTER FROM THE TSHWANE DISTRICT

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Enquiries: Dr. Lufuno Razwiedani
Tel: +27 12 451 9036
E-mail: lufuno.razwiedani@gauteng.gov.za

**TSHWANE RESEARCH COMMITTEE: CLEARANCE CERTIFICATE**

**MEETING: 10/2017**
**PROJECT NUMBER: 99/2017**
**NHRD REFERENCE NUMBER: GP_201711_004**

**TOPIC: Evaluation performance for routine health information system for reproductive health in Tshwane**

**Name of the Researcher:** Ms. Sophy Moloko

**Supervisor:** Dr. MM Ramukumba

**Facility:**
FF Ribeiro clinic, Lotus Gardens clinic
Atteridgeville clinic, Saulville clinic
Gazankulu clinic, Phomolong clinic
Folang clinic, Danville clinic
Hercules clinic, Bophelong clinic
Skinner Street clinic, Laudium CHC
Tshwane District Hospital

**Name of the Department:** UNISA

***NB: THIS OFFICE REQUEST A FULL REPORT ON THE OUTCOME OF THE RESEARCH DONE AND***

***NOTE THAT RESUBMISSION OF THE PROTOCOL BY RESEARCHER(S) IS REQUIRED IF THERE IS DEPARTURE FROM THE PROTOCOL PROCEDURES AS APPROVED BY THE COMMITTEE.***

**DECISION OF THE COMMITTEE:** **APPROVED**

.....
**Dr. R. Oyedipe**
**Acting Chairperson: Tshwane Research Committee**
**Date: 05/012/2017**

.....
**Ms. M. Lerutla**
**Acting Chief Director: Tshwane District Health**
**Date:** 06/12/17

# ANNEXURE N: TESTIMONIAL FOR PROVISION OF STATISTICAL DATA ANALYSIS

**Testimonial: Provision of statistical data analysis and reporting services**

**TO WHOM IT MAY CONCERN**

This serves to confirm that I, ELVIS M GANYALUPFU, provided statistical data analysis and reporting services as an independent Statistician consultant in an academic research study conducted as per the details provided herein below:

Principal Researcher: Ms Sophy Mogatlogedi Moloko
Contact Information_ Mobile: 0824425326; Email: smmoloko@gmail.com
Student Number: 46902546
University and Department: University of South Africa; Department of Health Studies
Thesis Title: Evaluating Performance of Routine Health Information System for Reproductive Health in Tshwane.
Degree: PhD in Public Health

Consistent with the nature of the primary survey data collected and statistical theory, suitable statistical techniques were selected and applied in conducting the following tests using the Statistical Package for Social Sciences (SPSS) software: frequencies and descriptive statistics, scale reliability and construct statistical validity, and exploratory factor analysis.

I take this opportunity to wish Sophy all the best in her future undertakings.

Signed.....

Date. 14/06/2021

# ANNEXURE O: SAMPLE OF TRANSCRIPT

## PARTICIPANT 6 INTERVIEW TRANSCRIPT

Interviewer
The purpose of this interview is to explore your role in the management of reproductive health information, to assess how the facility is using the reproductive health information in decision-making and to identify barriers and opportunities for effective data management processes at the facility. For the purpose of this interview, I am going to call you participate number 6.

### Q.1. Manager's role in role in health management system

Interviewer
Please describe your specific role in health information management system as a facility manager?

Participant6
As a facility manager I analyse data, there is capturing that is done by the data capturer and then after that I make sure that capturing is done on daily basis, after the capturing I analyse the information, also check if it's authentic and when all is above board I send it through to DHIS for further analysis

Interviewer
How do you check the authenticity of the information?

Participant6
Basically, at the end of every month, I compile monthly report. From the monthly report, I check if there's correlation in numbers because there's those indicators that are not talking to each other, and also check if all the information needed is in there. Because our tool it gives indication if something is wrongly captured, If not correctly captured, I then go back and verify before sending the report to the district

Interviewer
How does the tool give the indication?

Participant6
If your inputs are not correlating, take for instance if your headcount is 10 and for whatever reason you are having more babies in terms of your entry immunisations more than the 10, it immediately reflects the red light, saying that there is something that is not right, for instance if you are having 12 immunisations and your headcount is 10 clients and then there's 12, the tool itself is able to detect that there's more clients that are immunised than the head count

**Q.2. Views regarding the quality of reproductive health data**

Interviewer
What is your view regarding status of reproductive health data produced in the facility, meaning the quality of the reproductive health data produced in the facility?

Participant6
In terms of quality I do believe that we do produce quality data, because we also check correlation from the collection point where the consulting sister or the enrolled nurse is capturing, and we correlate that with the capturing of the data capturer on the MDS form that we are using, so there is correlation in that regard. The only challenge that we are having is that we don't have high numbers in terms of, and that is influenced also by the number of other facilities that we are having around, your private sector, we are having private practices and we are having private pharmacies around us that are providing the same product that we are giving

Interviewer
So the private facilities and the pharmacies that are providing reproductive health, how are they affecting your data?

Participant6
They are not affecting the data per se but the performance thereof

Interviewer
How are they affecting your performance?

Participant6
Most of our clients are employed, so if they don't have that thing of when they come in they are served and then go to work, it becomes a problem because when they go to the private GPs they are able to walk in and they are given the injection and they go back to work. So with us it's a public institution, they need to queue for a file, go for observations and then go to the sister, those are the records that are needed in their files, hence I was mentioning the fact that we try to fast track the queue so that we bridge that gap, so that they are able to use us as much as they are using the private sector, but that is still work in progress

**Q.3. Measures to ensure that staff member produce good quality data**

Interviewer
With regards to quality data, How are the staff members supported to produce good quality reproductive health data?

Participant6
We had a session with DHIS whereby we were trying to outline all the indicators and what is the meaning so that it is clearly understood by the health practitioners, as to when we are talking to an oral pill we provide packets, even when they are marking there, they can relate to the actual thing of the indicator itself. Initially there was a confusion in terms of understanding the actual indicator because you find that the clinicians that marked 1 even when they provided 2 packets or 3, and the indicators clearly specify that it is per packet, so we cleared those areas, at least at this point in time everybody is above board