

**THE DISTRICT HEALTH INFORMATION SYSTEM (DHIS) AS A SUPPORT  
MECHANISM FOR DATA QUALITY IMPROVEMENT IN WATERBERG DISTRICT,  
LIMPOPO: AN EXPLORATION OF STAFF EXPERIENCES**

by

**IDON NKHENSO SIBUYI**

submitted in accordance with requirements for

the degree of

**MASTER OF PUBLIC HEALTH**

**WITH SPECIALISATION IN MEDICAL INFORMATICS**

at the

**UNIVERSITY OF SOUTH AFRICA**

**Supervisor:** Prof BL Dolamo

**Co-Supervisor:** Dr RG English

November 2014

**DEDICATION**

*In loving memory of my mother*

*Favasi Idah Sibuyi*

*(20 Oct 1965 - 12 Dec 2003)*

*for her love and for always prioritising my education. Above all, she taught me  
to trust in God no matter the circumstances*

*Mama... how I wish you could have seen what the Lord has done in my life!*

## ACKNOWLEDGEMENTS

*I thank God Almighty for His unfading love and grace that enabled me to complete this study.*

*I wish to express my sincere gratitude and appreciation to all those who contributed and assisted me in compiling this study. In particular, I would like to thank the following people:*

- *Bethabile Dolamo, my supervisor, for her continued support, advice and encouragement throughout the study.*
- *René English, my co-supervisor, for her expert advice.*
- *The Limpopo Department of Health, Waterberg District, for opening their doors and making this study possible.*
- *Reshoketswe Happy Sibuyi, my wife, my best friend in the entire universe, for her unconditional love and support.*
- *Mpfuxelelo Tehila Sibuyi, my daughter, for believing in me more than I believe in myself.*
- *Frank and Dolly Sibuyi, my grandparents, for their unwavering support and for always “reassuring” me that they are proud of me. Unfortunately, Frank passed away before this study could be completed, may his soul rest in peace... etlela hi kurhula Mthunz’omuhle!*
- *Christa van den Bergh, my colleague and supervisor at HISP-SA, for encouragement, support and for always praying for me.*
- *Crizelle Nel, my colleague and mentor at HISP-SA, for your kind support whenever I needed study leave.*
- *Lené Kraft, for editing the manuscript.*

**Student Number: 4665-504-2**

**DECLARATION**

I declare that **THE DISTRICT HEALTH INFORMATION SYSTEM (DHIS) AS A SUPPORT MECHANISM FOR DATA QUALITY IMPROVEMENT IN WATERBERG DISTRICT, LIMPOPO: AN EXPLORATION OF STAFF EXPERIENCES** 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 and that this work has not been submitted before for any other degree at any other institution.



**Idon Nkhenso Sibuyi**

10 November 2014

**Date**

**THE DISTRICT HEALTH INFORMATION SYSTEM (DHIS) AS A SUPPORT  
MECHANISM FOR DATA QUALITY IMPROVEMENT IN WATERBERG DISTRICT,  
LIMPOPO: AN EXPLORATION OF STAFF EXPERIENCES**

**STUDENT NUMBER:** 4665-504-2  
**STUDENT:** IDON NKHENSO SIBUYI  
**DEGREE:** MASTER OF PUBLIC HEALTH  
**SPECIALISATION:** MEDICAL INFORMATICS (INFORMATION SYSTEMS)  
**DEPARTMENT:** HEALTH STUDIES, UNIVERSITY OF SOUTH AFRICA  
**SUPERVISOR:** PROF B.L. DOLAMO  
**CO-SUPERVISOR:** DR R.G. ENGLISH

**ABSTRACT**

The purpose of this study was to explore and describe staff experiences in managing data and/or information when utilising the District Health Information System (DHIS) as a support mechanism for data quality improvement, including the strengths and weaknesses of current data management processes. It was also aimed to identify key barriers and to make recommendations on how data management can be strengthened. Key informants included in this study were those based at the district office (health programme managers and information officers) and at the primary health care (PHC) facilities (facility managers, clinical nurse practitioners and data capturers).

An exploratory, descriptive and generic qualitative study was conducted. Consent was requested from each participant. Data were collected through semi-structured interviews.

The study findings highlighted strengths, weaknesses and key barriers as experienced by the staff. Strengths, such as having data capturers and DHIS software at most if not all facilities, were highlighted. The weaknesses and key barriers highlighted were staff shortages of both clinical and health management information staff (HMIS), shortage of resources such as computers and Internet access, poor feedback, training needs and

data quality issues. Most of the weaknesses and key barriers called for further and proper implementation of the District Health Management Information Systems (DHMIS) policy, the standard operating procedures (SOP), the eHealth strategy and training of the staff, due to the reported gaps between the policy and the reality and/or practice at the facility.

**KEY CONCEPTS:**

Data capturing

Data quality

Data flow

District Health Information System (DHIS)

Health program register

Routine health information

**CHAPTER 1:  
STUDY OVERVIEW**

<b>1.1. INTRODUCTION.....</b>	<b>1</b>
<b>1.2. BACKGROUND OF THE RESEARCH PROBLEM.....</b>	<b>3</b>
<b>1.3. DEFINITION OF KEY CONCEPTS.....</b>	<b>4</b>
<b>1.4. PURPOSE AND OBJECTIVES OF THE STUDY.....</b>	<b>6</b>
<b>1.4.1. Purpose.....</b>	<b>6</b>
<b>1.4.2. Objectives.....</b>	<b>7</b>
<b>1.5. THE RESEARCH DESIGN AND METHODOLOGY.....</b>	<b>7</b>
<b>1.5.1. DESIGN.....</b>	<b>7</b>
<b>1.5.1.1. Exploratory.....</b>	<b>8</b>
<b>1.5.1.2. Descriptive.....</b>	<b>8</b>
<b>1.5.1.3. Qualitative.....</b>	<b>8</b>
<b>1.5.2. METHODOLOGY.....</b>	<b>9</b>
<b>1.5.2.1. Population .....</b>	<b>9</b>
<b>1.5.2.2. Sample.....</b>	<b>9</b>
<b>1.5.2.3. Setting.....</b>	<b>10</b>
<b>1.5.2.4. Data collection.....</b>	<b>10</b>
<b>1.5.2.5. Data analysis.....</b>	<b>11</b>
<b>1.6. MEASURE TO ENSURE TRUSTWORTHINESS.....</b>	<b>11</b>
<b>1.7. ETHICAL CONSIDERATIONS.....</b>	<b>11</b>
<b>1.7.1. Ethical clearance and permission.....</b>	<b>11</b>
<b>1.7.2. Ethics during the study .....</b>	<b>12</b>
<b>1.8. SIGNIFICANCE OF THE STUDY.....</b>	<b>12</b>
<b>1.9. SCOPE AND LIMITATIONS.....</b>	<b>12</b>
<b>1.10. GENERAL OUTLINE OF THE STUDY .....</b>	<b>13</b>

**1.11. CONCLUSION .....13**



## CHAPTER 2:

## RESEARCH DESIGN AND METHODOLOGY

2.1.	INTRODUCTION .....	14
2.2.	RESEARCH DESIGN .....	14
2.3.	RESEARCH METHODS .....	14
	2.3.1. Qualitative inquiry .....	14
	2.3.2. Overview of qualitative research/inquiry .....	15
2.4.	TARGET POPULATION .....	15
2.5.	SAMPLING .....	16
2.6.	DATA COLLECTION .....	18
	2.6.1. Interview guide .....	18
	2.6.2. Trustworthiness .....	20
	2.6.2.1. Credibility .....	20
	2.6.2.2. Dependability .....	20
	2.6.2.3. Confirmability .....	20
	2.6.2.4. Transferability .....	21
2.7.	DATA ANALYSIS .....	21
2.8.	ETHICAL CONSIDERATIONS .....	22
	2.8.1. Beneficence .....	22
	2.8.2. Non-maleficence .....	23
	2.8.3. Respect for autonomy .....	23

2.8.4. Justice .....	24
2.9. CONCLUSION .....	24

<b>CHAPTER 3:</b>	
<b>DATA PRESENTATION, INTERPRETATION AND LITERATURE CONTROL</b>	
<b>3.1. INTRODUCTION .....</b>	<b>25</b>
<b>3.2. DESCRIPTION OF THE DATA INTERPRETATION PROCEDURES .....</b>	<b>25</b>
<b>3.3. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS .....</b>	<b>26</b>
<b>3.4. DISCUSSION OF CLUSTERS, THEMES AND SUB-THEMES .....</b>	<b>26</b>
<b>3.4.1. Challenges.....</b>	<b>29</b>
<b>3.4.1.1. Data quality.....</b>	<b>29</b>
3.4.1.1.1. <i>Data in the DHIS not corresponding to data on the register.....</i>	<i>29</i>
3.4.1.1.2. <i>Data incomplete or missing.....</i>	<i>31</i>
3.4.1.1.3. <i>Late submission of data.....</i>	<i>32</i>
3.4.1.1.4. <i>Poor of understanding of the importance of data quality.....</i>	<i>35</i>
<b>3.4.1.2. Insufficient and lack of resources.....</b>	<b>37</b>
3.4.1.2.1. <i>Staff shortage.....</i>	<i>38</i>
3.4.1.2.2. <i>Shortage of computer, telephone, internet, fax machines.....</i>	<i>39</i>
<b>3.4.1.3. Finding balance between clinical work and data/information management.....</b>	<b>40</b>
<b>3.4.1.4. Health programme registers.....</b>	<b>41</b>
3.4.1.4.1. <i>Duplication of data in different consultation rooms.....</i>	<i>41</i>
3.4.1.4.2. <i>Too many registers.....</i>	<i>41</i>
3.4.1.4.3. <i>Too many data elements.....</i>	<i>43</i>
<b>3.4.2. Strengths.....</b>	<b>44</b>
<b>3.4.2.1. DHIS.....</b>	<b>44</b>
3.4.2.1.1. <i>Having the software .....</i>	<i>44</i>
3.4.2.1.2. <i>Having data capturers in facilities.....</i>	<i>44</i>
3.4.2.1.3. <i>Daily data capturing method.....</i>	<i>45</i>
<b>3.4.2.2. Teamwork.....</b>	<b>45</b>
<b>3.4.3. Weaknesses.....</b>	<b>46</b>
<b>3.4.3.1. Poor data validation and verification.....</b>	<b>46</b>
<b>3.4.3.2. Poor and lack of feedback.....</b>	<b>47</b>

<b>3.4.4. Measures to improve and/or strengthen data management.....</b>	<b>49</b>
<b>3.4.4.1. Training and development.....</b>	<b>49</b>
3.4.4.1.1. <i>Health programme managers should train facility staff on their specific programmes.....</i>	<i>49</i>
3.4.4.1.2. <i>Train nurses on data management, including capturing data on DHIS.....</i>	<i>50</i>
3.4.4.1.3. <i>Feedback from upper level to lower, especially the facility.....</i>	<i>51</i>
<b>3.4.4.2. Procurement of resources.....</b>	<b>51</b>
<b>3.4.4.3. Web-based DHIS.....</b>	<b>52</b>
<b>3.4.4.4. Improve validation process.....</b>	<b>53</b>
<b>3.4.4.5. Database technical support at District &amp; sub-District levels.....</b>	<b>53</b>
<b>3.4.4.6. Reduce registers.....</b>	<b>54</b>
<b>3.4.4.7. Recruitment and detainment of more staff .....</b>	<b>54</b>
<b>3.4.4.8. Support from District to facility.....</b>	<b>54</b>
<b>3.5. CONCLUSION .....</b>	<b>55</b>

**CHAPTER 4:****CONCEPTUAL FRAMEWORK**

<b>4.1. INTRODUCTION.....</b>	<b>56</b>
<b>4.2. THE hss-AFRICA FRAMEWORK FOR HEALTH INFORMATION SYSTEM.....</b>	<b>57</b>
<b>4.2.1. Data collection, collation, verification and capture .....</b>	<b>58</b>
<b>4.2.2. Data transmission .....</b>	<b>59</b>
<b>4.2.3. Data processing, analysis and presentation .....</b>	<b>59</b>
<b>4.2.4. Resources for health management information systems .....</b>	<b>60</b>
<b>4.2.5. Organisational rules .....</b>	<b>60</b>
<b>4.3. CONCEPT MAP AND SUMMARY OF THE FINDINGS OF THE STUDY .....</b>	<b>62</b>
<b>4.3.1. Challenges .....</b>	<b>63</b>
<b>4.3.2. Strengths .....</b>	<b>64</b>
<b>4.3.3. Weaknesses.....</b>	<b>64</b>
<b>4.3.4. Measures to improve and/or strengthen data management.....</b>	<b>64</b>
<b>4.4. CONCLUSION.....</b>	<b>65</b>

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
--------------------------	-------------

## CHAPTER 5:

### CONCLUSIONS, LIMITATIONS, RELEVANCE AND RECOMMENDATIONS

<b>5.1. INTRODUCTION.....</b>	<b>66</b>
<b>5.2. PRESENTATION OF THE CONCLUSIONS AND UNDERSTANDING DEVELOPED BY THE STUDY.....</b>	<b>68</b>
5.2.1. Exploration and description experiences of staffs which manage and/or use data .....	68
5.2.2. Identification of the strengths and weaknesses of current data management processes.....	69
5.2.3. Identifying key barriers in the DHIS.....	69
5.2.4. Recommendations on how data management can be strengthened .....	70
<b>5.3. FURTHER PRACTICAL RECOMMENDATIONS, DESCRIPTIONS AND EXAMPLES OF ACTIVITIES THAT CAN IMPROVE DATA QUALITY FOR A DHIS USER IN LINE WITH THE FACILITY SOP.....</b>	<b>73</b>
5.3.1. During data collection .....	73
5.3.2. During preparation of data capturing .....	74
5.3.3. During data capturing .....	74
5.3.4. After data capturing .....	75
5.3.5. How the tick register data may be collected, summarised and captured into the DHIS .....	75
<b>5.4. IDENTIFICATION OF STUDY LIMITATIONS.....</b>	<b>76</b>
<b>5.5. DISCUSSION OF THE RELEVANCE OF THE STUDY.....</b>	<b>77</b>

**5.6. RECOMMENDATIONS FOR FURTHER RESEARCH.....77**

**5.7. CONCLUSION .....78**

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
--------------------------	-------------

---

**LIST OF REFERENCES:**

<b>REFERENCES.....</b>	<b>79</b>
------------------------	-----------



<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
--------------------------	-------------

---

**ANNEXURES:**

<b>ANNEXURE 1</b> REQUEST PERMISSION FROM LIMPOPO HOD FOR HEALTH.....	<b>87</b>
<b>ANNEXURE 2</b> REQUEST FOR ACCESS FROM WATERBERG DEP OF HEALTH....	<b>89</b>
<b>ANNEXURE 3</b> UNISA ETHICAL CLEARANCE CERTIFICATE .....	<b>91</b>
<b>ANNEXURE 4</b> APPROVAL FROM LIMPOPO HOD FOR HEALTH.....	<b>92</b>
<b>ANNEXURE 5</b> PERMISSION TO ACCESS WATERBERG PHC FACILITIES.....	<b>93</b>
<b>ANNEXURE 6</b> PERMISSION TO USE DATA COLLECTION TOOLS.....	<b>94</b>
<b>ANNEXURE 7</b> PARTICIPANT INFORMATION SHEET & CONSET FORM.....	<b>95</b>
<b>ANNEXURE 8</b> DATA COLLECTION TOOL ONE.....	<b>98</b>
<b>ANNEXURE 9</b> DATA COLLECTION TOOL TWO.....	<b>100</b>
<b>ANNEXURE 10</b> DATA CLLECTION TOOL THREE.....	<b>102</b>

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
--------------------------	-------------

---

**TABLES:**

<b>Table 3.1</b> Participants' demographic characteristics.....	<b>26</b>
<b>Table 3.2</b> Clusters, themes and sub-themes.....	<b>27</b>
<b>Table 5.1</b> Four strategic health outputs and sub-outputs of the NSDA .....	<b>66</b>
<b>Table 5.2</b> Health information systems in National Strategic Plan 2014/15 – 2018/19...	<b>67</b>
<b>Table 5.3</b> Health information systems in annual performance plan.....	<b>67</b>

**FIGURES/DIAGRAMS:**

<b>Figure 2.1</b> South Africa Districts showing Waterberg District within Limpopo Province, Coordinates.....	<b>16</b>
<b>Figure 3.1</b> Findings of Performance information (Van der Merwe I, NDoH.....)	<b>30</b>
<b>Figure 3.2</b> The facility data submission time frames (Department of Health, 2012a:8) :.....	<b>34</b>
<b>Figure 3.3</b> The Performance of Routine Information System Management (PRISM) framework and tools (from Bradshaw et al, 2013:789).....	<b>36</b>
<b>Figure 3.4</b> Summary of Characteristics of Data Quality:.....	<b>37</b>
<b>Figure 3.5</b> Selected findings of the Health Information Audit Report (Sourced from Loveday, Smith and Monticelli, 2006).....	<b>38</b>
<b>Figure 3.6</b> Routine Data Handling/information management Process (Source: Heywood & Rohde, 2001).....	<b>48</b>
<b>Figure 4.1</b> The Information Cycle (Department of Health 2009: 6(3)).....	<b>56</b>
<b>Figure 4.2</b> The hss-Africa Framework for Health Information System.....	<b>58</b>
<b>Figure 4.3</b> The Possible Misinterpretation and/or loss of Information (Sourced from presentation by: Moleko W 2012:21).....	<b>61</b>
<b>Figure 4.4</b> Concept Map Summarising the Experiences of the Staff in utilising the DHIS for Data Quality Improvement.....	<b>63</b>

**ABBREVIATIONS:**

<b>CNP</b>	Clinical Nurse Practitioners
<b>DEM</b>	District Executive Manager
<b>DHIS</b>	District Health Information System
<b>DHISS</b>	District Health Information System Software
<b>DHMIS</b>	District Health Information Management System
<b>DIO</b>	District Information Officers
<b>ESI</b>	Enhancing Strategic Information
<b>FIO</b>	Facility Information Officers
<b>FOM</b>	Facility Operational Managers
<b>HAST</b>	HIV, AIDS, Sexually Transmitted Infections and Tuberculosis
<b>HBCS</b>	Home-Based Care and Support
<b>HIS</b>	Health Information Systems
<b>HISP-SA</b>	Health Information Systems Program – South Africa
<b>HMIS</b>	Health Management Information System
<b>HOD</b>	Head of Department
<b>HPM</b>	Health Programme Managers
<b>hss-AFRICA</b>	Health Systems Strengthening Africa
<b>IT</b>	Information Technology
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MCWH</b>	Mother, Child and Women’s Health
<b>MMedSc</b>	Master of Medical Science

<b>MPH</b>	Master of Public Health
<b>NDoH</b>	National Department of Health
<b>NGO</b>	Non-governmental Organisation
<b>NSDA</b>	Negotiated Service Delivery Agreement
<b>PHC</b>	Primary Health Care
<b>PEPFAR</b>	President's Emergency Plan for AIDS Relief
<b>PMTCT</b>	Prevention of Mother to Child Transmission of HIV/AIDS
<b>RHINO</b>	Routine Health Information Network
<b>SAHIA</b>	South African Health Informatics Association
<b>SOP</b>	Standard Operating Procedures
<b>WHO</b>	World Health Organisation

# CHAPTER 1:

## STUDY OVERVIEW

### 1.1. INTRODUCTION

Data quality is a cross-disciplinary concept that cuts across government, banking, financial, non-profit organisations and service organisations, and is now also emerging as an independent discipline (Kerr, 2006:2). Statistics South Africa (2010:5), the custodian of all official statistics in South Africa, defines data quality in terms of 'fitness for use' and has produced a South African Statistical Quality Assurance Framework (SASQF), which consists of eight dimensions of data quality, namely; relevance, integrity, timeliness, accessibility, reliability, completeness, accuracy and coherence, including compatibility. These eight dimensions of data quality are also applied in the health information system. According to Matsoso and Fryatt (2013:157), the South African future health system is aimed at moving toward national health insurance (NHI), which will rely on an effective information system, and efforts are required that will improve, amongst others, data quality in the health sector.

The primary health care (PHC) is delivered through the District Health System (DHS). The DHS is the organisational entity which entails a geographic and population-based approach to the planning and management of health services as mandated by the National Health Act 61 (2003:76) and has been a core component of the post-1994 strategy to create a decentralised and unified healthcare system in South Africa (Wolvaardt, Johnson, Cameron, Botha & Kornik, 2014:82). Historically, the South African health information system has been characterised by fragmentation and lack of coordination, prevalence of manual systems, such as too much paperwork and poor automation (Department of Health, 2012c:5) The more the interest, understanding and addressing of issues that define, control and affect data quality in the various districts' health information systems, namely, the District Health Management Information System (DHMIS), the more the success towards achieving the quality that is relevant to the current health needs.

According to the Department of Health in South Africa (2011a:6), a District Health Information System (DHIS) is an electronic database which was established in 1996 as a system to collect, store, aggregate and analyse routine aggregated data in the public

health service. The DHIS is listed as one of the successful national systems in place (Department of Health, 2012c:20). Health Information Systems Programme – South Africa (HISP-SA) (2014) describes the DHIS as a health information management tool written in Microsoft® Access® and Visual Basic® for applications which run on most Microsoft® Windows® platforms, supports Windows® XP up to Windows® 8.0 and Microsoft® Office 2003, 2007 or 2010. The DHIS is open-source, and users can modify, translate or derive works based on the source code (HISP-SA, 2014). The DHIS also boasts a number of built-in features to improve data quality, such as minimum/maximum data entry where captured data can be evaluated against minimum and maximum expected values automatically, rules-based validation where data can be validated using absolute and/or statistical rules and Gap and Outlier Analysis where missing records or outliers are identified (HISP-SA, 2014).

In 2000, the DHIS was adopted as the official routine health information system for South Africa, hence this study is looking at data quality in the light of the DHIS. It is regarded as one of the most profound developments in the country as part of the democratic dispensation and has remained a significant part of the Health Management Information System (HMIS) in South Africa (Department of Health, 2011a:6).

According to the Department of Health (2009:6), in an ideal situation facilities would submit data to the District's information management department, which are staffed by District Information Officers (DIOs) who have a responsibility to use the DHIS to ensure that the quality of data is complete and accurate. The Department of Health strongly emphasises the provision of quality data by the facilities to the DIO, because poor quality data are regarded to have the potential to provide misleading information. In the collection and reporting processes of health data, the major defects exist mainly in both the completeness and accuracy thereof (Mate, Bennett, Mphatswe, Barker & Rollins, 2009:4). Health data are needed for national reporting and planning, including allocation of resources. Without addressing the underlying causes of the defects, the data cannot be fit to inform decisions as it is supposed to (Mate, *et al.*, 2009: 4).

The facility manager has a definite responsibility of ensuring the collection of all data elements by clinicians and other staff such as data capturers and/or information officers involved in any stage of the information cycle as such, and submitting it to the District (The Department of Health, 2009:6). In South Africa, data that are submitted to the District Office are primarily collected at the level of health facilities are primarily

collected by clinical nurse practitioners and other clinicians, and captured by data capturers with the aim of using it for reporting, planning and compliance in the health sector and beyond, hence its quality is pivotal.

An information system used in a district can impact on health services through data collection, collation, reporting and evidence-based decision making, hence the experiences of the facility managers, clinical nursing practitioners, data capturers, health information officers and District Information Officers can assist in exploring the use of the DHIS as a support mechanism in improving data quality. Computerised systems allow facilities to collect data in the same format for easier aggregation, analysis, reporting and vertical submission to the districts. Information systems and computerised databases have become critical for capturing and maintaining data, hence the importance of looking at the DHIS in terms of data quality in the districts cannot be more emphasised (Issell, 2009:299).

National health priority programmes and donor-funded programmes, with focus on HIV/AIDS and TB, are aimed at achieving ambitious goals (University of North Carolina, 2006:1) which are evaluated mainly by means of data. In order to measure these initiatives, strong monitoring and evaluation systems must be in place to produce accurate, valid, reliable and timely data reports.

The Department of Health (2011a:11) expects that data for each public healthcare facility should be captured into the electronic District Health Information System (DHIS) to them in an electronic format by each province on a monthly basis, and that this information be present.

## **1.2. BACKGROUND OF THE RESEARCH PROBLEM**

According to Moule and Goodman (2014:464) a research problem is a 'broad topic area of interest that has perplexing or troubling aspects which can be "solved" by the accumulation of relevant information or evidence'. Research problems can be identified through a number of sources, such as the personal experiences of a clinician or any other professional; theories; published literature; research reports and national initiatives (Schmidt & Brown, 2009:57).

Most health programmes fall under the service package of PHC in developing countries, making routine reporting of data critical (Byrne & Sahay, 2003:1). If data quality is poor,



or perceived to be poor, all the evidence-based health programme management processes stand a risk of breaking down (Enhancing Strategic Information, 2012:47). This study is inspired by the National Department of Health's Rapid Information Needs Assessment under the category of District Health Information (Department of Health, 2011 b:i)

According to the report on the District Health Barometer (2013:347), 'Waterberg District spent 57.1% of the district health services budget for 2012/13 on district hospitals, the second highest expenditure nationally and the highest in the province. In contrast, the District's expenditure on primary health care (PHC) services at 35.5% was the second lowest nationally and lower than the provincial average expenditure on PHC services of 43.3%. The proportion of district health services expenditure on district management for the year 2012/13 was 7.4%, the second highest in the province' (Massyn, Day, Dombo, Barron, English, Padarath, 2013:347). This report has motivated the researcher to conduct this study in this District office and PHC. Also, DHIS is used in this district to capture routine information on facility-based services and community-based campaigns.

One cannot improve data quality without first examining the system that produces data (University of North Carolina, 2006:1). Taking a closer look at the DHIS, data management and flow processes may be useful to a researcher who has an interest in data quality. Hence, this study will focus on both the facility and district levels where data are collected and submitted respectively, and will hear from the data collectors (clinicians), the capturers (administrators), PHC (Primary Health Care) facility managers and the district information officers. However the topic of this study did not include the word PHC because the study did not focus on PHC facilities only but included even staff from district office.

### **1.3. DEFINITION OF KEY CONCEPTS**

**Quality:** The degree to which a product or service meets requirements and expectations (Harman, 2006:634). In this study quality will refer to the degree in data generated in health facilities meets the requirements as determined by the department of health as per the DHMIS (District Health Management Information System) policy.

**Quality improvement:** A system in which individuals in the organisation look for ways to do things better, usually based on understanding and control of variation (Harman,

2006:634). In this study quality improvement is the system and/or measure implemented in order to enhance the degree into which the data meets its requirements as determined by the department of health.

**Data quality:** The set of issues that allows one to assess different dimensions of data quality (e.g. accuracy, timeliness, consistency) and to improve such dimensions by means of activities that may operate directly on data or else on processes that interchange or elaborate data (Viscusi, Batini & Mecelle, 2010:22). In this study the data quality definition is adopted as defined above.

**Data integrity:** 'The entire set of characteristics associated with data quality. These include data content – including currency, relevance to the decision-making purpose – and accuracy, scope, level of detail, composition, consistency and structural consistency, and reaction to change, which concerns how data elements are updated, deleted, or added to a database' (Harman, 2006:628). In this study the data integrity definition is adopted as defined above.

**District Health Information System Software (DHIS Software):** 'A software solution or electronic database used to collect, store and analyse information' (Department of Health, 2011a:6). In this study the DHIS software definition is adopted as defined above.

**District Health Management Information System (DHMIS):** 'The DHMIS is inclusive of, but much broader than the DHIS software. It includes the people, policies and procedures, hardware, software, networks and datasets required to ensure a well-functioning information system' (Department of Health, 2011a:6). In this study the DHMIS definition is adopted as defined above.

**District Health Information System (DHIS):** According to Van den Bergh (2009:16) the abbreviation 'DHIS' is used interchangeably in published literature for the DHMIS and the DHIS software. Therefore, in this study 'DHIS' will only be used for the DHIS as software.

**eHealth:** According to the World Health Organisation it is "the use of information and communication technologies (ICTs) for health to, for example, treat patients, pursue research, educate students, track diseases and monitor public health"(WHO, 2014). This study adopts this definition as it is.

**Healthcare data:** ‘Raw facts, generally stored as characters, words, symbols, measurements or statistics’ (Wager, Lee & Glaser 2009:42). The healthcare data on its own is generally not useful for decision-making but once processed it becomes increasingly more useful. This study adopts this definition as it is.

**Information:** Processed data. According to Wager *et al* (2009:42), processing ‘broadly covers everything from formal analysis to explanations supplied by the individual decision-maker’s brain’. This study adopts this definition as it is.

**Routine health information:** ‘Information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs. The routine health information system is an aspect of local service delivery that has been created to capture data about healthcare provision, management, service delivery, administration and financing, as well as data about morbidity, births and deaths routinely’ (RHINO, 2001:2). This study adopts this definition as it is.

**Data/information capture:** ‘The process of recording representations of human thought, perceptions or actions in documenting patient care, as well as advice-generated information that is gathered and/or computed about a patient as part of healthcare’ (Medical Records Institute, 2004:2). This study adopts this definition as it is.

## **1.4. PURPOSE AND OBJECTIVES OF THE STUDY**

### **1.4.1. Purpose**

The purpose of the study was to explore and describe the experiences of staff members using the DHIS and develop ways of improving data quality in Primary Health Care (PHC) facilities in Waterberg District, Limpopo Province. The key informants were staff members whose jobs include the collection, processing, analysis, presentation, interpretation or use of data and/or information. This study focused on the PHC facilities in order to contribute, if possible, to the implementation of PHC re-engineering.

### **1.4.2. Objectives**

The following objectives guided this study:

- To describe experiences of staff who manage and/or use data on health programmes;
- To identify the strengths and weaknesses of current data management processes as experienced by the staff working with data;
- To identify key barriers in the DHIS utilisation;
- To make recommendations on how data management can be strengthened.

## **1.5. THE RESEARCH DESIGN AND METHODOLOGY**

This study is an exploratory, descriptive and generic qualitative study (see Chapter 2).

The researcher chose to use a qualitative technique because according to the Department of Health (2012c:5), considerable resources were invested in health information systems, however, during the final analysis, expected returns on investment were not generated. The 2012 Department of Health eHealth strategy makes provision for several challenges in health information systems including data quality, which needed to be addressed with timelines, but even in 2014 most have not been addressed yet. Therefore this study aims to develop an understanding of the experiences of staff at the lower levels where data are generated (Department of Health, 2012c:31).

### **1.5.1. Design**

A research design is the overall plan for addressing a research question, including specifications for enhancing the integrity of the study (Polit, Beck & Hungler, 2001:470)

### **1.5.1.1. Exploratory**

The researcher aimed to get a clear picture of the situation in DHIS utilisation in data management as experienced by the participants (De Vos, Strydom, Fouche & Delport, 2011:95). Exploratory studies are not intended for generalisation to larger populations, but mainly to gain knowledge for the particular field of study (Burns & Grove, 2009:557).

### **1.5.1.2. Descriptive**

Descriptive studies are intended to provide characteristics that give a description of a particular situation, and may also be used amongst others to identify problems in the current practice, justify current practice and even make judgments (Burns & Grove, 2009:237).

### **1.5.1.3. Qualitative**

Holloway and Wheeler (2010:3) define qualitative research as ‘a form of social inquiry that focuses on the way people make sense of their experiences and the world in which they live. A number of different approaches exist within the wider framework of this type of research and many of these share the same aim – to understand, describe and interpret social phenomena as perceived by individuals, groups and cultures. Researchers use qualitative approaches to explore the behaviour, feelings and experiences of people and what lies at the core of their lives’. In this study the qualitative research design was used with the purpose of describing the experiences of staff using DHIS in managing healthcare data. This was done by asking open-ended questions to the relevant staff through a semi-structured interview.

## **1.5.2. Methodology**

According to Cresswell (2009:15-16) research methods represent an element of research that involves data collection, analysis and interpretation. Furthermore, it can be divided into quantitative, qualitative and/or mixed methods. Qualitative and quantitative research methods can be used separately or in combination. However, this study followed a qualitative method only.

### **1.5.2.1. Population**

Population is defined as ‘the entire group of persons or objects that is of interest to the investigator. The population is designated by specific criteria, such as age, gender and illness state’ (Brockopp & Hastings-Tolsma, 2003:515).

The target population for this study were the health information managers and officers (District and sub-District), facility operational managers, PHC supervisors and health programme managers working at district and sub-District levels. The study was conducted in the Waterberg District, Limpopo Province. According to the information in the DHIS software, this district has five sub-districts and a total of 54 PHC facilities (52 clinics and 2 community healthcare centres).

### **1.5.2.2. Sample**

A sample is a subset of the population selected by the investigator to participate in a research project (Brockopp & Hastings-Tolsma, 2003:519). The sample is selected using sampling techniques (Moule & Goodman, 2014:464), and the sampling method is determined by the study design and the desired outcomes of the study.

The researcher aimed to identify, find and access key individuals who have the potential to provide rich sources of data; hence purposive sampling was used to maximise the latter (Procter, Allan & Lacey, 2010:142). Data were obtained from the accessible participants (Holland, 2010:92). The sample was not determined before the study commenced, since saturation, ‘a state where no new data of importance to the specific

study and developing theory emerge and when the elements of all categories are counted for' (Holloway & Wheeler, 2010:341), was to be used to determine the end of sampling.

### **1.5.2.3. Setting**

The research setting was the premises of the facility and the District Office. A thorough description of the facilities will form part of the research report. According to Holloway and Wheeler (2010:47), researchers locate and make use of a suitable setting for the research. In this study, the participants indicated the times when they were available for research. For some it was during their lunch time, while others found time after working hours (but in the working environment). The participants in the District Office were each interviewed in the boardroom. Those at the facilities made use of vacant consultation rooms and the information officer's office. Privacy was maintained by closing doors and voices were reasonable low during the interviews such that the person from outside could not hear and/or follow the conversation just like when examining a patient.

### **1.5.2.4. Data collection**

Data collection is the 'gathering of information needed to address a research problem' (Polit, *et al.*, 2001:460). In qualitative research it is emphasised to record in field notes of a description of what was seen, said and done in the research process, including interpretation (Topping, 2010:129).

In this study, an interview guide was used as a research instrument. According to Holloway and Freshwater (2007:76), the narrative interview is 'the tool through which the researcher gains access to the stories of the participants', simplifying it as 'a strategy of collecting data in the form of words from the participants who are asked to share their experience or lives'. Interviews were digitally recorded.

### **1.5.2.5. Data analysis**

Dyson and Norrie (2010:34), define data analysis in qualitative study as ‘the process we proceed from data collection to interpretation, explanation and understanding of the participants and situations of interest to us’.

The responses or information from the participants were open-ended, hence manual analysis was used. This involves reviewing all recorded information thoroughly, looking for themes or patterns, and coding (Brockopp, *et al.*, 2003: 368). The process of analysis from identifying clusters, themes, and coding is described in Chapter 2.

## **1.6. MEASURE TO ENSURE TRUSTWORTHINESS**

Trustworthiness is a ‘term used in the evaluation of qualitative data, assessed using the criteria of credibility, transferability, dependability, and confirmability’ (Polit, *et al.*, 2001:472). In this study, like any other qualitative study, trustworthiness is crucial and was measured (see Chapter 2).

## **1.7. ETHICAL CONSIDERATIONS**

Holloway and Wheeler (2010:53) define ethics as ‘the dignity, right, safety and well-being of the participants’.

### **1.7.1. Ethical clearance and permission**

According to Moule and Goodman (2014:52), a researcher should seek ethical review of the proposed research to ensure that ethical standards are met. In this study, the researcher also sought written proof of ethical review clearance from relevant ethical committees before the research project was started. The research proposal was sent to the University of South Africa (UNISA) Health Research Ethics committee for approval. It was also sent to the Limpopo Department of Health Research Ethics Committee for another approval. Once the provincial approval had been granted, arrangements were made with Waterberg Health District to access the District Office and facilities, and the researcher was also invited to give a brief presentation of the proposal on the study to



the District Executive Management Committee. The committee granted the researcher official permission to access PHC facilities. The specific individuals, being the staff in the District were contacted for planning, and then the study was conducted as per agreed plan.

The interview questions used were sourced from English (2011: Appendix 1, 2&3), and permission was granted in writing. These questionnaires have been used for a study conducted in the Western Cape in 2011; however, the questionnaires were modified for utilisation in this study.

### **1.7.2. Ethics during the study**

The ethics and wellbeing of the participants was taken into consideration during the study (see number 2.8 in Chapter 2)

## **1.8. SIGNIFICANCE OF THE STUDY**

This study is significant as it may assist health information staff, health programme managers, hospital managers, hospital information managers, Primary Health Care (PHC) managers, PHC supervisors, clinicians and sponsors (e.g. USAID) to optimise the quality routine information, strengthen best practices and identify and rectify areas that need improvement in data management.

The results of the study may be used as a guideline in developing and/or implementing action plans for data challenges or other health information concerns.

## **1.9. SCOPE AND LIMITATIONS**

Although there may be other role-players in district information systems, this study will only focus on the experiences of facility managers, clinical nurse practitioners, health information officers, District Information Officers and facility information officers. Only PHC facilities staff formed part of the study; hospital staff were not included. Also, it did not involve analyses of the captured data in the DHIS database, patients file review or health programme registers.

### **1.10. GENERAL OUTLINE OF THE STUDY**

This first chapter is an overview of the study. The second chapter discusses the research design and methodology for the study and the third chapter presents, interprets and discusses the data with literature control. The fourth chapter discusses the conceptual framework and the fifth concludes the study, discusses the relevance and limitations of the study, and makes recommendations for further research.

### **1.11. CONCLUSION**

This chapter introduced the study by outlining the research problem and the background to the problem. The purpose and objectives were also outlined. The key concepts were defined. The research design and methodology, measures to ensure trustworthiness, ethical considerations, significance and limitations of the study were discussed. The general outline of the study report was also included

## **CHAPTER 2:**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **2.1. INTRODUCTION**

In this chapter the reader is presented with an overview of the research methodology applied in the study. A discussion on the collection of the data, the target population, sampling, and analysis as they occurred in the study is also presented.

As stated in the first chapter, the main objectives of this study were to explore and describe experiences of staff when using the District Health Information System, and to identify the strengths and weaknesses of current data management processes as experienced by the staff involved in the data flow process within the district. In order to address these objectives, an interview guide was used in interviewing the participants.

#### **2.2. RESEARCH DESIGN**

Moule and Goodman (2014:462) define research design as a 'map of the way in which the researcher will engage with the research participants to achieve the outcomes needed to address the research aims and objectives'.

A qualitative approach was followed to facilitate exploration of the participants' experience through face-to-face and personal contact (Moule & Goodman, 2014:175-176).

#### **2.3. RESEARCH METHODS**

##### **2.3.1. Qualitative inquiry**

Waltz, Strickland and Lenz (2010:225) define qualitative inquiry as 'an approach to research that focuses on the description and understanding of phenomena or concepts within the social world from the perspective of individuals who are experiencing that world'. Qualitative approaches are useful in the health sector because they sharpen the understanding of the phenomena being researched. They also assist in advancing the

practices with the goal of improving health outcomes by assisting others through similar situations (Waltz, *et al.*, 2010:225).

### **2.3.2. Overview of qualitative research/inquiry**

Qualitative research can be done for a variety of reasons, including when there is little knowledge (published or unpublished) about a concept or phenomenon, an emerging phenomenon or concept. However, in this study it is done simply for exploration and description of the selected staff experiences using the DHIS in producing data (Waltz, *et al.*, 2010:225).

According to Moule and Goodman (2014:207) and Waltz *et al.* (2010:226) qualitative approaches have, amongst others, the following key characteristics:

- It is most commonly inductive reasoning, where the researcher starts with data and proceeds building; it is the generation of concepts, categories, hypotheses models and in some cases theories.
- It is concerned with process and meaning from the participants' view, with the primary purpose of understanding the participants' world, not to show causality or outcomes.
- It is undertaken in a naturalistic setting and the researcher is immersed within it in order to see the whole picture.
- The primary focus throughout the research process is participants' experiences, views and perceptions

## **2.4. TARGET POPULATION**

According to Moule and Goodman (2014:461), population is a 'group of people, documents, events or specimens about whom or which the researcher is interested in collecting information or data. The composition of a population in a study meets specific or defined criteria and it can also be referred to as target population (Burns & Grove, 2005:746).

Waterberg District in Limpopo Province was selected because the researcher was inspired by the study conducted in Western Cape and wished to do a similar or related

study in another province, but looking at only one district, while using the same questionnaires used by English (2011:1).

The target population for this study included the Primary Health Care (PHC) facility operational managers, clinical nurse practitioners, health programme managers and health information officers (facility-based, district and sub-district based).

Waterberg District is one of the five districts in Limpopo Province of South Africa, it is located in the south-western part of Limpopo Province, bordering Botswana and the North West, Gauteng and Mpumalanga provinces:



**Figure 2.1** South Africa Districts showing Waterberg District within Limpopo Province, Coordinates: [🌐24°42'S 28°24'E](#) (Source: Wikipedia, 2014)

## 2.5. SAMPLING

According to Procter, Allan and Lacey (2010:142), sample size is regarded as a non-intrinsic feature in qualitative research analysis. Usually, the researcher aims to use available resources and the feasibility to obtain the sample combined in determining the size. The researcher strived to get in-depth and rich data by sampling until the point of data saturation, where no more new themes were emerging from the data (rather than large number of responses, hence the number of participants in the sample was not predetermined)(Holland, 2010:92; Burns & Grove, 2005:535).

The inclusion criteria were aimed at staff members whose jobs include the generation, collection, processing, analysis, presentation, interpretation or use of data and/or information. Hence, the key informants' job designations were as follows:

- District Information Officers (DIO)
- Facility Information Officers (FIO)
- Facility Operational Managers (FOM)
- Clinical Nursing Practitioners (CNP)
- Health Programme Managers (HPM)

The sampling frame was aimed at including those participants who will reflect as closely as possible the characteristics of the target population (Moule & Goodman, 2014:291-292). In this study, like most qualitative studies, purposive sampling was used with the aim of sampling those participants who have experiences and/or characteristics that are of interest in this study (Moule & Goodman, 2014:300).

The researcher set parameters in order to limit the target population through inclusion or eligibility criteria, which related to work experience, age, job description and gender (Moule & Goodman, 2014:291-292). According to Burns and Grove (2005:343) inclusion criteria refer to the characteristics that a participant must possess to be included in the sample. Hence, the inclusion criteria for participants in this study were:

- At least 18 years of age to enable them to consent for themselves;
- At least one year experience in the post;
- Both males and females were included;
- Nurses:
  - only facility managers and clinical nurse practitioners, both from PHC facilities
  - Health programme managers from the District Office;
- Health information officers:
  - only based in facility (FIO) and District Office (DIO).

## 2.6. DATA COLLECTION

Data collection is defined as the precise and systematic gathering of the information needed to address a research problem. As such, the method must be relevant to the research purpose or specific objectives, and questions (Burns & Grove, 2005:733; Polit, Beck *et al.*, 2001:460).

### 2.6.1. Interview guide

A semi-structured interview guide was used to collect data. An interview, as defined by Moule and Goodman (2014:459), is 'a data collection technique that includes gathering information through verbal communication'. Interviews can be managed in one-to-one situations, groups, over the telephone and face-to-face (Moule & Goodman, 2014:291-292). According to De Vos *et al.* (2011: 196), open-ended questions in a questionnaire permit the participant to write any answer in the open space and allow the researcher to learn about how the respondent thinks, their creativity, self-expression and helps to get an answer to a question with many possible answers.

The purpose of a semi-structured interview is to be able to have both pre-determined topics and open-ended questions. Interviews have proven to be effective in capturing and categorising issues as perceived and experienced by the participant. The interviews were conducted by the researcher verbally to 'probe and investigate hidden and suppressed views and experiences' (Tod, 2010:345). Probing is defined by Polit *et al.* (2001:738) as 'to elicit more useful or detailed information from a respondent in an interview than was volunteered in the first reply'. Where face-to-face was inconvenient, the participant might have been on leave, for example, a telephonic interview would have been conducted as an alternative; however, telephonic interviews were not conducted in this study.

During the interview process, the researcher interviewed qualifying, willing and accessible participants to avoid any form of under-representation of a particular group. The questions sought the participants' responses in their own words. The researcher did not lead or influence the participants' responses in any way, but only guided the participants (Tracey, 2013:56). Their responses were recorded in writing and/or electronically by the interviewer.

According to Moule and Goodman (2014:352), interviewing has the following potential advantages and disadvantages:

**Advantages of interviews:**

- It can be a flexible technique, allowing the researcher to explore issues in depth.
- It has the potential to ensure questions are understood, enhancing validity.
- The researcher can potentially seek clarification of meaning from the participant.
- Structured interviews can collect a large amount of data from a large sample.
- Telephonic interviewing can be resource-saving and attract increased participation rates.
- Response rates can be high.
- It can be a more inclusive data collection method.

**Disadvantages of interviews:**

- Individual qualitative interviews can be time-consuming and costly.
- Levels of power or authority issues can affect data collection.
- Researchers can introduce bias into the interview, especially with less structured interviews.
- Researchers need interviewing skills to collect quality data.
- The researcher's safety can be an issue.
- Researchers can collect powerful data which affects them personally.

In an attempt to address the above-mentioned disadvantages, it is noted that there were no power level issues, since the researcher always reassured the participants that he was conducting this study as a student. A semi-structured interview guide was used to minimise potential bias, and the researcher conducted the interviews and clarified the questions in cases where the participants needed clarity. Safety was addressed, following ethical procedures and there were no data collected that affected the researcher personally.



## **2.6.2. Trustworthiness**

### **2.6.2.1 Credibility**

According to Moule and Goodman (2014:455) a study has credible findings 'if they reflect the experience and perceptions of the participants'. In order to ensure credibility, after collecting and analysing the data, the researcher returned to the District and discussed the findings with the participants to ensure the themes were indeed what the participants had meant.

At the time of this study, the researcher in his full-time job, was also involved in training clinicians and information staff in health information strengthening, which included daily data capturing, collection and data quality, so these experiences would ensure better understanding of the participants' responses and eventually maximise confidence in the data (Polit *et al.*, 2001:312-316). The researcher is a qualified health professional (optometrist) and is registered with the Health Professional Council of South Africa. A study report was made available to the participants through the District Office.

### **2.6.2.2. Dependability**

According to Houser (2008:266), 'dependability of qualitative data is focused on the stability of the information across individuals or over time'. In this study, the interviews were widely spread amongst facility staff and the District information and health programme management staff.

### **2.6.2.3. Confirmability**

Should there be a need to confirm that this study took place and that the researcher involved himself at the District Office and facilities, an entrance register was signed with the security during each visit as proof. Furthermore each participant completed and signed the consent forms in their own handwriting, and field notes and/or digital records of the interviews were recorded as well, which can be used to confirm the data. The entire process from data collection to data analysis is detailed in this research report.

#### **2.6.2.4. Transferability**

Transferability is defined as “the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings” (Research Methods Knowledge Base, 2014).

The description of the District, facility and characteristics of participants is provided in the report, in case there is a possibility for transference, although that is not the aim of this study. However, an individual who may wish to "transfer" the results of this study to a different context or setting will then responsible for making the judgment of how sensible the transfer is (Research Methods Knowledge Base, 2014).

### **2.7. DATA ANALYSIS**

According to Brockopp and Hastings-Tolsma (2003:364) ‘data analysis in qualitative inquiry involves careful mulling-over of recorded data to discover apparent patterns, themes, or relationships’. Moule and Goodman (2014:460) add that ‘narrative analysis can form part of the textual data within research. Those undertaking narrative analysis are concerned with the structure of the story, rather than focusing on content’.

The process of analysis involved the following steps, as described by Moule and Goodman (2014:414-415):

- Transcripts were read to identify content and grasp the impression of what the participant meant.
- Careful selection was made from the entire content of initial key data as statements.
- Meaning was formulated from the statements.
- The information was organised into clusters and themes.
- The themes were coded and described in full.

After the analysis process, the researcher validated the themes of the data by presenting the interpretations to the participants (Moule & Goodman, 2014:407).

In this study, data were presented and interpreted with the help of literature control. Burns and Grove (2009:720) define review of relevant literature as the 'analysis and synthesis of research sources to generate a picture of what is known and not known about a particular situation or research problem. Data analysis is conducted to reduce, organise and give meaning to data' (Burns & Grove, 2009:695).

Upon analysis, when reporting, in some instances the researcher included selected snippets of qualitative data as said by the participants in the report to allow readers to judge the authenticity of the findings (Topping, 2010:129).

## **2.8. ETHICAL CONSIDERATIONS**

The protection, dignity, safety and well-being of participants were kept at the forefront of this study and the researcher was alert to the possibility of unanticipated ethical dilemmas (Moule & Goodman, 2014:48; Streubert & Carpenter, 2011:56).

### **2.8.1. Beneficence**

Streubert and Carpenter (2011:63) describe the principle of beneficence as 'doing good and preventing harm', and explain that it is applicable to participants' confidentiality and anonymity when conducting a study. In this study the principle of beneficence can be further described as doing what is at least good, proper, acceptable and right, with the aim of preventing harm when conducting a study.

To address the principle of beneficence, the participants' identities are protected, including their names which are not disclosed and the study report is completed in a manner that specific participants cannot be linked to specific data. In this study no patient files are reviewed and no confidential clinical information is discussed whatsoever. Only staff experiences in dealing with data are discussed.

### **2.8.2. Non-maleficence**

Moule and Goodman (2014:60) define the non-maleficence principle as 'doing no harm'. A researcher has a duty to prevent harm; it may be physical, psychological, emotional, social or economic, keeping in mind that some harm may be necessary to avoid other or even further harm to promote favourable and/or good results at the end (Moule & Goodman, 2014:60).

In this study, only questions related to health information systems were asked, no personal information that could lead to psychological or emotional harm was asked from the participants, and the researcher constantly remained sensitive by being ready and quick to detect any potential harm in this regard when conducting the interviews (Dyson & Norrie, 2010:45).

### **2.8.3. Respect for autonomy**

According to Holloway and Wheeler (2010:54), respect for autonomy is 'respecting the decision-making capacities of autonomous persons'. Participants were given information before they could voluntarily consent to participate in the study. The information comprised amongst others, details such as length of the interview, potential benefits and risks (Dyson & Norrie, 2010:44). Informed consent forms were provided. The following points amongst others, were clarified:

- There will be no risk for the participant or the facility in participating in this study.
- No expenses are due by the participants or District for participating in this study.
- No reimbursement will be made to the participants or District during and/or after the study.
- Participants may withdraw at any stage of the study, should they wish to do so.

'Informed consent means that participants have adequate information regarding the research, are capable of comprehending the information, and have the power of free choice, enabling them to consent voluntarily to participate in the research or decline voluntarily' (Polit & Beck, 2004:151), 'without actual or perceived coercion' (Dyson & Norrie, 2010:44).

#### **2.8.4. Justice**

According to Streubert and Carpenter (2011:65), amongst others, 'the principle of justice concerns fair treatment'. In agreement with this, Moule and Goodman (2014:59) add to fairness the prevention of preference or favouritism to, or any form of discrimination with some participants over others. Also, the interest of the participants must be put first, before those of the researcher.

Anonymity and confidentiality were also prioritised, since qualitative research can be more intrusive than quantitative research, bearing in mind that small samples are used in qualitative research, whereas thick descriptions are used in qualitative studies. Holloway and Wheeler (2010:342) describe it as 'dense, detailed and conceptual description which gives a picture of events and actions within the social context'. So the researcher had to be more sensitive when communicating the findings, and anonymity was guaranteed (Holloway & Wheeler, 2010:60).

#### **2.9. CONCLUSION**

This chapter covered the discussion of the research design and methodology, as well as the ethical considerations. It also dealt with the strategies employed to ensure trustworthiness. The next chapter will address data presentation and analysis with literature control.

## **CHAPTER 3:**

# **DATA PRESENTATION, INTERPRETATION AND LITERATURE CONTROL**

### **3.1. INTRODUCTION**

This chapter covers the presentation and interpretation of the data, as well as the literature control.

Polit *et al.* (2012:739) define qualitative data as ‘information collected in narrative (non-numeric) form, such as the dialogue from a transcript of an unstructured interview’. In this study, a semi-structured interview guide was used to collect data, and participants verbally responded to the interview.

Qualitative data interpretation ‘involves making sense of the data and the “lessons learned”’ (De Vos, *et al.*, 2011:416). In this process, the researcher examined the data descriptively, striving to become familiar with the nature of the data (Burns, *et al.*, 2009:463). Polit *et al.* (2012:739) also define the analysis of qualitative data as ‘the organisation and interpretation of narrative data for the purpose of discovering important underlying themes, categories and patterns of relationships’. The analysis process is discussed in Chapter 2.

### **3.2. DESCRIPTION OF THE DATA INTERPRETATION PROCEDURES**

According to Moule and Goodman (2014:407), the process of interpreting data in a qualitative study involves selecting and simplifying the data from the initial field notes. Next, the identification of codes, themes or clusters is done. Thereafter, data are transformed and organised in order to draw conclusions. Similarly, in this study the process was followed as described in Chapter 2.

### 3.3. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

The demographic characteristics of the participants were as follows:

**Table 3.1** Participants' demographic characteristics

<b>Age:</b>	18 – 24	<b>0</b>	<b>Number of Years Employed:</b>	1 - 5	<b>5</b>
	25 – 30	<b>2</b>		6 - 10	<b>0</b>
	31 – 40	<b>5</b>		11 -15	<b>4</b>
	41 – 60	<b>9</b>		15 & above	<b>7</b>
<b>Level of Education:</b>	Matric	<b>4</b>	<b>Gender:</b>	Male	<b>4</b>
	Diploma	<b>6</b>		Female	<b>12</b>
	Degree	<b>4</b>		Other	<b>0</b>
	Master's / PhD	<b>2</b>	<b>Total Number of Participants:</b>	<b>16</b>	

### 3.4. DISCUSSION OF CLUSTERS, THEMES AND SUB-THEMES

The findings will be presented in this order:

- **Clusters** (a group classification, named according to the question asked).
- **Themes** ('A recurring regularity emerging from an analysis of qualitative data', as defined by Polit *et al.* (2012:744), provided under each theme and coded). In this study, some themes were broken down into **sub-themes**.
- **Remarks** from the participants' responses and the **discussion of themes and sub-themes** will be covered in this section as well.
- **Direct quotations from participants' responses** will also be included (provided in a textbox, written in italics and with quotation marks).

The analysis identified the following clusters, themes and sub-themes reflecting the participants' experiences as presented in Table 3.2.

**Table 3.2** Clusters, themes and sub-themes

Cluster	Theme	Sub-theme
3.4.1. Challenges	3.4.1.1. Data Quality	3.4.1.1.1. Data in the DHIS not corresponding to data on the register 3.4.1.1.2. Data incomplete 3.4.1.1.3. Late submission of data 3.4.1.1.4. Poor understanding of data quality
	3.4.1.2. Insufficient and lack of resources	3.4.1.2.1. Staff shortage 3.4.1.2.2. Shortage of computers, telephones, Internet, fax machines, Universal Serial Bus (USB) flash drives / memory sticks
	3.4.1.3. Finding balance between clinical work and data/information management	
	3.4.1.4. Health programmes registers	3.4.1.4.1. Duplication of data in different consultation rooms 3.4.1.4.2. Too many registers 3.4.1.4.3. Too many data elements
3.4.2. Strengths	3.4.2.1. DHIS	3.4.2.1.1. Having the software 3.4.2.1.2. Having data capturers in facilities 3.4.2.1.3. Daily data capturing method
	3.4.2.2. Teamwork	
3.4.3. Weaknesses	3.4.3.1. Poor data validation and verification	
	3.4.3.2. Poor and lack	



	of feedback	
3.4.4. Measures to improve and/or strengthen data management	3.4.4.1. Training and development	3.4.4.1.1. Health programme managers should train facility staff on their specific programmes 3.4.4.1.2. Train nurses on data management, including capturing data on the DHIS 3.4.4.1.3. Feedback from upper level to lower, especially the facility
	3.4.4.2. Procurement of resources	
	3.4.4.3. Web-based DHIS	
	3.4.4.4. Improve validation process	
	3.4.4.5. Database technical support at District and Sub-district levels	
	3.4.4.6. Reduce registers	
	3.4.4.7. Recruitment of detainment of staff	
	3.4.4.8. Support from District to facility	

### 3.4.1. Challenges

#### 3.4.1.1. Data quality

*'Since it is manual work at the facility, data quality can be compromised at this level.'*

Hebda and Czar (2013:65) define data management as 'the process of controlling the collection, storage, retrieval and use of data to optimise accuracy and utility, while safeguarding integrity'.

Most studies conducted on the evaluation of HIS performance have somehow 'neglected competence or other behavioural factors (Nicol, Bradshaw, Phillips & Dudley, 2013:788), or just listen and interpret what the experiences of the staff are, while the focus has not given enough explanation, if ever, of the determinants of HIS successes or failure in different settings (Nicol, *et al.*, 2013:788). Not much has been evaluated on competence, motivation and experiences (Nicol, *et al.*, 2013:788), moreover, 'own best practices or even worst have not been exposed, shared and described enough.

Externally-funded programmes or even national priority programmes may be reluctant in sharing their data because of lack of faith in the quality of district, provincial or national databases (Braa, Heywood & Sahay, 2012:381).

##### *3.4.1.1.1. Data in the DHIS not corresponding to data on the register*

Most participants pointed out data quality issues as their perspectives on information management, such as data in the DHIS software not corresponding with the data in the source documents. Also, data incompleteness, data loss, late submission of data by lower levels and lack of resources, such as computers and even staff shortage.

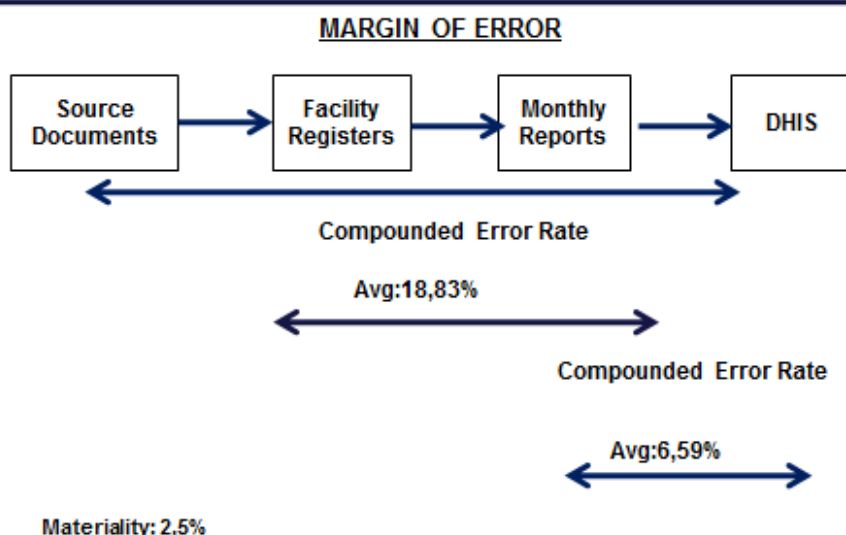
Most of them come to this conclusion when comparing source documents with the data captured in the software. Having raw data submitted was also pointed out to be of assistance to the programme managers when comparing data.

*'There are times when I doubt the DHIS calculates well, especially the indicators because it is in percentages, so we need to be able to confirm the DHIS calculations manually. Sometimes the figures are too good to be true and sometimes too poor, considering the fact that one knows the circumstances in the facilities.'*

RHINO (2003:38) agrees that training and development should not be underestimated in health information system (HIS); the database design and operations applied to calculate indicators and generate reports can be challenging for staff to implement alone.

Studies have shown a significant amount of incompleteness and inaccuracy of data in health programmes; this even includes missing data from registers between 4,5% and 41% of the time. Also, the DHISS values also showed deviation on average by 75% from the corresponding values found in the registers (Mate *et al.*, 2009:3). The differences between the source documents, registers and the DHIS became a major concern and this clearly affects the data quality (Health Information System Program, 2013:3).

### **FINDINGS ON PERFORMANCE INFORMATION 2011/12**



*Courtesy of: Mr. I. Van der Merwe, CFO, National DoH*

21

**Figure 3.1** Findings of Performance Information (Source: Van der Merwe,ND, DoH)

The Auditor-General of South Africa is constitutionally mandated as responsible for accountability and governance in the public sector through auditing performance data, which includes health data, other than financial data (English, Masilela, Barron & Schonfeldt, 2011; Republic of South Africa, Public Audit Act, 2008:3).

The Presidency's Government-wide Monitoring and Evaluation Guideline (2007:3) prescribes data collection processes in monitoring and evaluation. The regulatory framework in the District Health Management Information Policy (DHMIS) cannot be over-emphasised (Department of Health, 2011a:13). The National Evaluation Policy Framework (2011:iii) encourages evidence-based management, which is through data of good quality.

Discussions with the participants also indicated that poor policy implementation and understanding of standard operating procedures contribute to poor quality of the data. There was also consensus amongst the participants that if data quality was discussed in meetings and decisions were made based on the available data, facilities could perform better in terms of quality data.

Like other sound systems, legislative and regulatory processes can enhance HIS effectiveness by re-enforcing professional ethics, and create norms and standards for data quality and dissemination. Standards enable data to be received in a way that it is understood, which will eventually reduce ambiguity in communication (Sensmeier, 2011:233).

#### *3.4.1.1.2. Data incomplete or missing*

Participants reported incompleteness and missing of data.

*'Although I am not a nurse, before I capture the data I count the running totals on the tick register again and sometimes you find that they make mistakes, because the handwriting is not clear and they do it in a hurry.'*

*'It is very important to capture each and every number, no data should leave a facility if it is not complete.'*

*'Sometimes you get confused when you see data from national level which does not corresponding with the performance. They are performing very high at facility level but when national or provincial reflect it, you can see that this is not according to performance. When you ask yourself what went wrong, data were possibly underreported, but you cannot identify the root cause between here and there.'*

In the collection and reporting process of health data, the major defects exist mainly in both the completeness and accuracy (Mate *et al.*, 2009:4). This health data are needed for national reporting and planning, including the allocation of resources. Without addressing these underlying causes of the defects, the data cannot be fit to inform decisions as it is supposed to (Mate *et al.*, 2009:4).

Missing data are very common; it can happen if information has to be abstracted from medical records but the clinician did not actually record the particular information. In such a case where data have been collected already, it is difficult to retrieve the particular missing data (Issell, 2009:366). After data have been collected, it is good practice to review the data for any missing items of which, in terms of the DHIS, could include data completeness checks (Issell, 2009:366).

#### 3.4.1.1.3. Late submission of data

Participants reported that facilities do not submit data on time and the submitted data have violations at times.

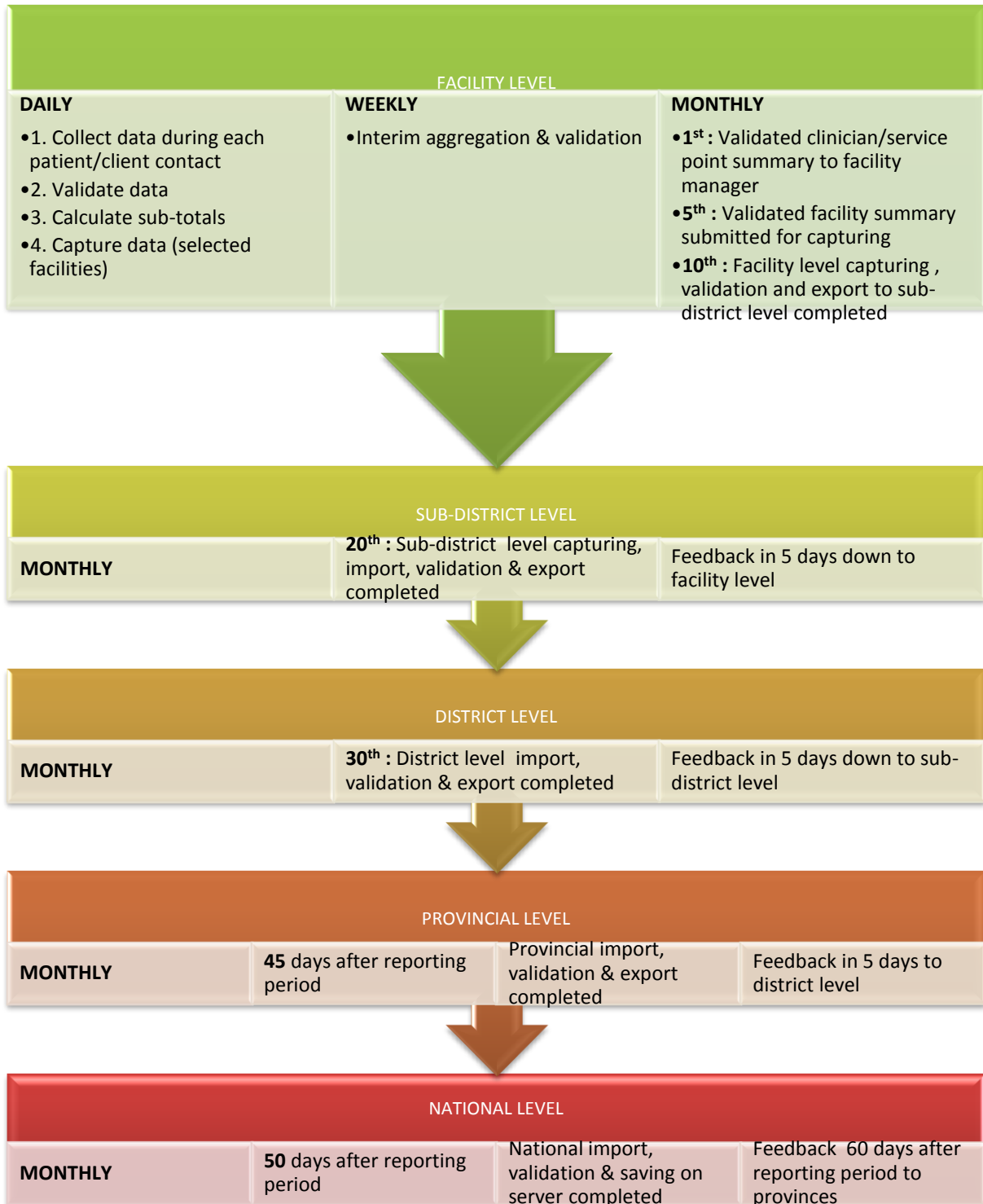
*'When we have to do the end of quarterly reporting, you find that data are not complete, and we are under pressure because the province needs the quarterly report. Some facilities don't stick to submission dates.'*

*'When the data capturer is on leave, who will submit the data?'*

*'Sometimes you ask for data today and someone else asks tomorrow. When you look at it you find that the data differs and you ask yourself why. Maybe it is because it was*

*incomplete at the time because others submitted late. I'd suggest that we wait until data are complete before send-out.'*

The production of necessary, timely and understandable information requires quality-checked processes and procedures of a HIS (Department of Health, 2011b:3). There is significant consensus so far in literature that 'timely, valid, and reliable data should be easily available and accessible to managers at all levels of the healthcare system to inform effective decision-making and reporting' (ESI, 2012:17).



**Figure 3.2** The facility data submission time frames (Source: Department of Health, 2012b:8)

#### *3.4.1.1.4. Poor understanding of the importance of data quality*

Most programme managers pointed out poor understanding, even lack of understanding, of the importance of data and its quality. The Pacific Health Information Network (PHIN) has the following quote on their website: 'In recent years, data quality has become an important issue, not only because of its importance in promoting high standards of patient care, but also because its impact on government budgets for the maintenance of health services' (PHIN, 2014).

Data quality is crucial in health facilities, however, the data collected in the facilities are perceived to be inaccurate or incomplete (Institute for Health Care Improvement, ND:3), and it may also not be in time, or may be much more than needed. This compromises the quality of the data and it may lead to the lack of use of data due to its quality being questionable. In order to explore the causes of inaccuracy, incompleteness or untimeliness of the data, one may have to look at the data flow within the District.

*'People don't know that data can affect the allocation of funds.'*

*'I don't know if we'll ever get it right. The people who collect the data do not collect it for the service improvement. They are collecting it to be sent to the next level. No data are collected for action.'*

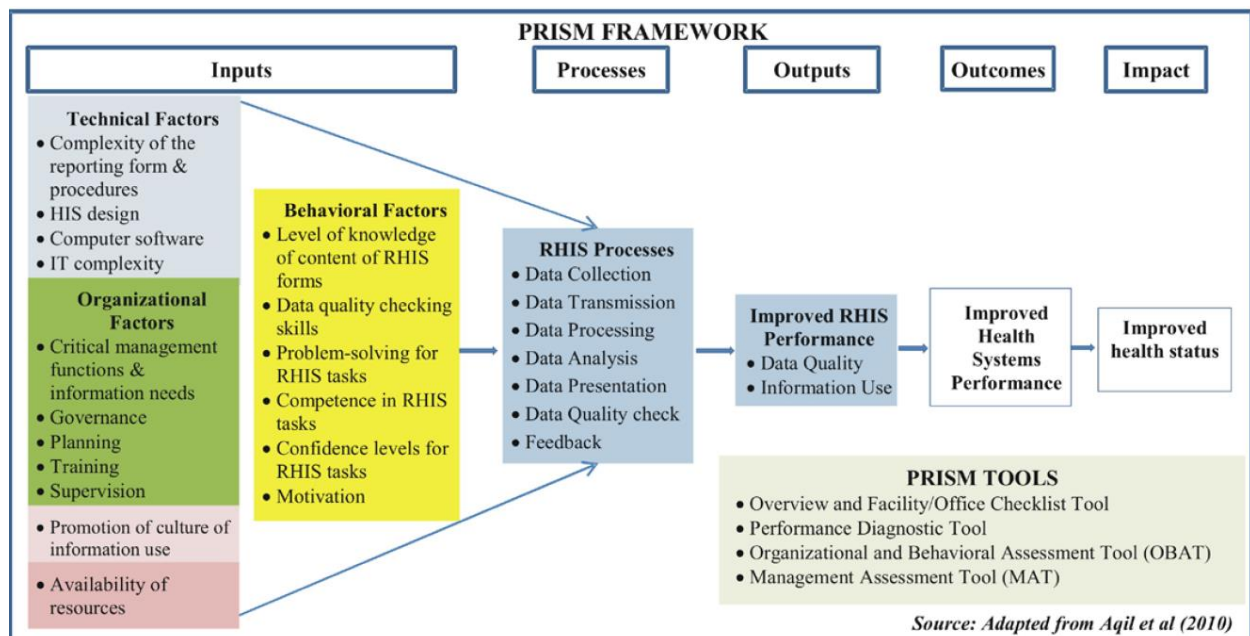
*'People must be empowered at the source, the facilities. The importance of data quality must be emphasised at facility.'*

Health data, if accurate and reliable, may be needed for patient care, medico-legal purposes, public health reporting, research, statistical information on utilisation of health services in a given geographic area, allocation of resources, quality assurance and improvement and policy-making (WHO, 2003:7). Quarterly reviews of financial expenditures are using service data to justify budget spent on, amongst others, health programmes (RHINO, 2003:39)



It is vital for a facility to have quality data for use in patient care. Furthermore, the very same data can be used in monitoring the performance of the health service and employees (WHO, 2003:11). There also exists, amongst others, limited resources for data quality improvement as well as a lack of awareness amongst staff about the importance of data and its quality (WHO, 2003:34).

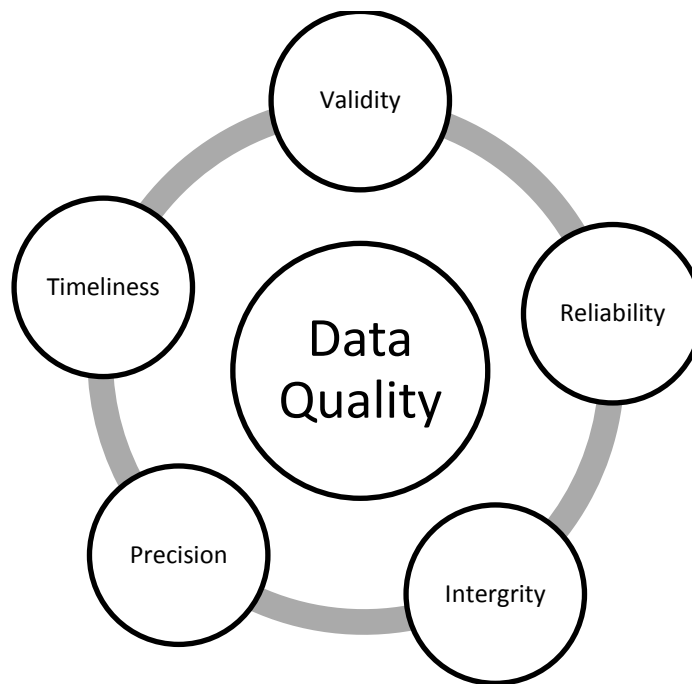
Data quality improvement interventions that involved training for healthcare workers on the importance of health data and/or information, data reviews and feedback, and regular data audits showed effectiveness in improving data quality, particularly increasing completeness and accuracy in health programme data (Mphatswe, Mate, Bennett, Ngidi, Reddy, Barker & Rollins, 2012:179).



**Figure 3.3** The Performance of Routine Information System Management (PRISM) framework and tools (Source: Bradshaw, *et al.*, 2013:789)

The framework in figure 3.3 proposes that Routine Health Information System (RHIS) processes, including data collection, transmission, processing, analysis, data quality checks and feedback, are affected not only by technical issues, but also by staff behaviour and organisational determinants (Nicol, *et al.*, 2013:789).

Data quality has the following characteristics: Validity (standardised, clearly defined), Reliability (accuracy and consistency), Integrity (complete and true), Precision (error-free), Timeliness (meet deadlines) (ESI, 2012:49; Department of Health, 2011a:25).



**Figure 3.4** Summary of Characteristics of Data Quality

#### **3.4.1.2. Insufficient and lack of Resources**

Participants have reported insufficient and lack of resources. This theme was further divided into staff shortage and shortage of computers, telephone, internet and fax machines. Before discussing these sub-themes, taking a look at the results of an audit conducted in 2006 could assist in understanding this theme.

This audit was about the challenges with national policy on HIS and the thought of its contribution to poor data quality, hence it was carried in all provinces in South Africa which focused on human resources relating to HIS, the skills of HIS staff and the available IT equipment (Loveday, Smith & Monticelli 2006:5).

**Appointment of HIS officers:**

- ◆ 35% of the HIS staff were not in official permanent HIS posts.
- ◆ Only 20% of HIS staff members had been in their posts for more than five years.
- ◆ 33% of the HIS staff members had been in their posts for less than a year and 17% had been in their posts for less than six months.
- ◆ 42% of the HIS staff members spent less than 80% of their time on HIS work.

**Training for HIS activities:**

- ◆ At a national level, less than half (45%) of the HIS staff members had received sufficient training (at least a week) to carry out their work.
- ◆ Nationally, 35% of the HIS staff members had received no training in the DHIS software, and a further 20% had received training of less than a week, which would be considered inadequate (nearly all of these were staff recruited recently).

**Access to computers and internet:**

- ◆ Although over 95% of HIS staff had access to computers, many of these computers needed upgrading (hardware and software) in order to function effectively.
- ◆ 12% of staff members did not have access to printers.
- ◆ 33% of HIS staff members did not have access to email, 39% did not have access to the government intranet and 50% did not have internet access.

**Figure 3.5** Selected findings of the Health Information Audit Report (Sourced from Loveday, Smith and Monticelli, 2006 (in Rohde, Shaw, Hedberg, Stoops, Venter, Venter & Matshisi 2008:195))

#### 3.4.1.2.1. Staff shortage

Participants reported staff shortage as one of the challenges faced at the facilities.

*'I was supposed to be attending training today, but I could not go because the other sister is off sick, we are short-staffed, it's patients, it's registers, yoh!'*

*'The person who is supposed to supervise is exhausted because we are short of staff.'*

*'There are many causes, some may not have been identified, such as shortage of staff that leads to lack of supervision of people capturing data.'*

There is a lack of time due to pressure of work, staff shortage and poor skills in data collection (WHO, 2003:34). 'With many healthcare professionals under pressure to provide maximum services at minimum cost, documentation is not always a high priority' (WHO, 2003:34).

#### 3.4.1.2.2. Shortage of computer, telephones, Internet, fax machines

Shortage of resources, computers in particular, was mentioned as contributors to their challenges, for instance, having a computer for DHIS and another for Tier.Net. The participants raised a need for access to the Internet so that data could be submitted by email. Other needs such as USB flash drives were also mentioned.

*'Although we are two data capturers in the clinic, we have one computer. I have to wait for her to capture on DHIS and then I work on Tier.Net. If we had two computers, it would be faster.'*

*'Sometimes data are sent to the next hospital for capturing because some facilities do not have computers or laptops. They have to take that raw data manually, as it is, and go to the nearest institution at the hospital.'*

According to Li, Bheemavara and Zhang (2010:39), any kind of data manipulation threatens its quality, whether it be storage variance, format variance, transfer or extraction. However, software used properly to check and/or verify the correctness could deal with this issue. Efficient communication is crucial in accomplishing work goals; fixed and mobile phones are good assets for the well-functioning of the HIS (RHINO, 2003:37).

Strategies for information management in developing countries are either not comprehensive at all or not as comprehensive as they ought to be; they are focus-orientated for specific systems or sub-systems, such as statistics, neglecting other useful components of HIS needed for effective HIS. Like any other system, HIS consists of integrated components working towards a common goal and any shortcoming or change in one component affects all other components (ESI, 2012:14).

Inputs are all available and accessible resources in use for the work of a HIS and may include, amongst others, funding, policies, standards, strategies, staff, standardised lists of data elements and indicators, and equipment, such as computers, networks and software (DHIS) (ESI, 2012:14). Outputs are the products and/or services produced by a particular system.

#### **3.4.1.3. Finding balance between clinical work and data/information management**

The participants reported that there is too much recording for each patient and they end up neglecting the data and prioritising clinical work because patients complain. Data management was reported to be neglected because patients are many and staff are too few, with no allocated time to do administrative work, such as data management.

*'The very professionals miss the numbers due to poor concentration because of the heavy workload.'*

One of the major challenges in routine health data and/or information, especially in developing countries such as South Africa, revolves around clinical practitioners who are faced with the dilemma of generating (by means of examining patients) and compiling (by recording and/or capturing) the data. These have led to data being a 'second best' to patient care and being the 'thing to be done later'. This poses lag-time which may compromise the quality of the data eventually produced (Nicol *et al.*, 2013:788).

According to RHINO (2003:49), understanding of the data management workload on clinical staff, especially the nurses, can assist in reviewing and improving the data management processes if the current system is overburdening, and can also serve as a baseline for assessing any changes in data management processes.

#### 3.4.1.4. Health programme registers

Routine health facility data are mainly collected as data for each patient in the form of longitudinal or daily register or in the form of aggregated means of tick or tally sheets (Department of Health, South Africa, 2011a:7).

##### 3.4.1.4.1. Duplication of data in different consultation rooms

Participants find moving registers between consultation rooms to be challenging and it is also the cause of miscalculations.

*'Sometimes, there is duplication on the registers – a first antenatal patient will go for HCT to the lay counsellor now, and when returning to the sister for follow-up, the sister ticks the register as if she is the one who did the test. So in our facility we decided to use only the PMTCT register for first-time antenatal patients.'*

This refers to register allocation, where a register that may be allocated for a specific consultation room is moved to another, which can cause duplication or even loss of data. Participants therefore expressed the need to allocate registers to consultation rooms so that when a staff member moves to work in another room they will find another register there, instead of carrying them around.

##### 3.4.1.4.2. Too many registers

Having to record information in different registers was one specific aspect that participants reported that needed to be changed or improved. It was reported to be time-consuming while one has patients in the queue. Participants reported that the level of recording should be reduced by reducing the number of data elements, perhaps even the size of registers. Participants reported that different health programmes have their

own and/or different registers, resulting in too much workload in terms of data management.

*'There is too much writing involved, from one register to another. If we were to tell programme managers, they would say it is for continuity of care. My question is: do they really use all these data?'*

There is poor standardisation, if any, of data collection tools and a large number of registers which are usually for vertical data reporting purposes and sometimes for staff performance reviews. Over and above this vertical reporting, there is poor data feedback mechanisms back to the facilities (English, *et al.*, 2011:81-89)

Routine data have different uses, including patient care, public health and/or health programme monitoring purposes (Department of Health, 2011a:10-15). The purpose of routine data is to determine the format, type and amount of data. Patient care/management requires detailed data for each patient, while public health monitoring needs fewer elements or indicators to identify priority needs. Interventions and available results thereof are determined for specific geographical areas (Department of Health, 2011a:10-15).

It is vital for data collectors and capturers to find the format of data collection tools easy to understand and follow. An effective HIS system includes 'relevant, timely and accurate data which is available and accessible in a user-friendly format to the line and programme managers at each level of the healthcare system, as well as to other relevant role players and communities (ESI, 2012:68).

The reduction of indicators and datasets has proved to reduce the number of data elements to be collected and eventually reduce the staff workload (Braa, Heywood & Sahay, 2012:380). If there is consensus that certain data are not being used, it is better not to collect it at all, for instance, disaggregated data (by age, sex or common disease) might not be used in some programmes (Braa, *et al.*, 2012:380).

The lack of single records is contributing as a limiting factor to data quality. Keeping more than one record for each patient raises a quality problem; some health programme staff insist on keeping their own record, for example HIV/AIDS and TB patients, thus limiting the overall collection of meaningful data about an individual patient (WHO,

2003:25). The lack of single records for individual patients is growing in paper-based facilities.

#### 3.4.1.4.3. *Too many data elements*

The number of data elements collected was reported to be too high, taking too much time that should be used for treating patients; thus, reducing it would eventually reduce the size of registers. Some elements on the register are not collected, so staff suggested that they be removed because they sometimes make mistakes by recording in the wrong fields and therefore feel that only the required fields should appear on the register.

*'When I started nursing more than twenty years ago, we had very few elements – about five if I'm not wrong – but not more than ten. But since then, HIV and AIDS have changed things.'*

*'Some of the elements on the DHIS are not in the register, we have to add them by hand and that is where mistakes happen because one sister will add, while another one will forget to add on the register. We must have all the latest elements on the register. If the element is not collected, it must be removed. Can you see these blank spaces? We don't collect for these, but they still appear on the register.'*

Facilities have reported the challenges they face with the high amount of data to collect and collate (Garrib, Stoops, McKenzie, Dlamini, Govender, Rohde & Herbst, 2008:550). The shortage of health informatics skills and even feedback to support facilities is also a challenge that facilities face (Garrib *et al.*, 2008:551). According to RHINO (2003:39), the number of data elements can be reduced by utilising indicator-based data sets.



### 3.4.2. Strengths

#### 3.4.2.1. DHIS

##### 3.4.2.1.1. *Having the software*

There was consensus amongst the participants that having the software is a strength in the HIS. The DHIS consists of broadly two parts: Data Management (which includes the collection, collation and analysis) and the software (DHISS) (Garrib, *et al.*, 2008:550).

Routine data/information as defined by RHINO (2001:2) is 'information that is derived at regular intervals of a year or less through mechanisms designed to meet predictable information needs'. In South Africa our DHIS is regarded as a source for routine health information. Routine data in the DHIS should cater for the programme management (e.g. HIV and AIDS, and TB), planning, monitoring and evaluation.

##### 3.4.2.1.2. *Having data capturers in facilities*

Having data captured into the DHS software was a strength cited by most participants.

*'At least we have the data capturers in the facilities and data are being captured; I can say it is a strength.'*

Data capturers at this stage are not health professionals, their job is to capture the data from paper to the DHIS, as recorded by the nurses. Most if not all facilities in the Waterberg District have at least one data capturer. The combination of a data capturer and the DHIS software has been mentioned by most participants as a strength in the health information system because of the major role they play in the current data management in the facilities, for instance, without the data capturer data would not be captured at facilities and without the DHIS there would be no software to capture data into at the facilities.

### 3.4.2.1.3. Daily data capturing method

The daily and weekly data collection system was pointed out to be a strength because it is quicker to find and follow up on discrepancies, and it reduces data workload at the end of the month. The daily data capturing systems were reported to be reducing data quality challenges, such as missing data and discrepancies, making it easier to pick up and rectify mistakes.

*'Since we started with the daily data capturing, the data quality has improved; you can even follow up when there are discrepancies.'*

Achieving quality in data should be prioritised during the process of data collection. Once data have been captured in a tool/system, validation becomes time-consuming and cumbersome (ESI, 2012:28). Data should be correct at the point of entry, whether collected on paper or on a computer (WHO, 2003:5).

Daily data capturing (DDC) is the practice of continuously capturing routine data on a daily basis as it is generated, including the saving and storing of data in a database. If, for instance, there are some missing data, the data capturer can follow up with the staff member concerned right away, instead of waiting for the month-end to follow up, where the generator of the data might have even forgotten about the specific mistake or query. This DDC is currently being piloted in some clinics.

### 3.4.2.2. Teamwork

Irrespective of the challenges mentioned before, the participants' responses were in agreement that there is indeed commitment and teamwork amongst staff in the information management unit.

All PHC facilities must submit data to the district information management (The Department of Health, 2009:6). The Department of Health strongly emphasise provision of quality data by the PHC facilities, because poor quality data are regarded to have the potential of misleading the entire system if submitted (The Department of Health, 2009:6). The facility manager has a definite responsibility of ensuring the collection of all data elements and other staff involved in any stage of the information cycle should

understand the definitions of data elements. Furthermore, the PHC supervisors should check and support the facility in the process (The Department of Health, 2009:6).

Clinical staff may sometimes be trapped in focusing on raw data unnecessarily, while not focusing on indicators, but once there is collaboration between information officers and health programme managers, the focus shifts to targets and indicators and it becomes more 'epidemiological' (Braa, *et al.*, 2012:381).

### **3.4.3. Weaknesses**

#### **3.4.3.1. Poor data validation and verification**

Participants' responses indicated that data were not validated before submission to them. The processes followed in the facilities to validate if data were reported to be poor and the number of data collection tools having to be completed at facility level was reported to be many.

*'For example, "UICD inserted" is not on the register, making it difficult when we do stats because people tick wrongly and go around changing headings on the register.'*

*'At the facility level is where you can make corrections and compare with the source document.'*

It is evident that quality checks (for timeliness, correctness and completeness) improve data quality at the facility level (Braa, *et al.*, 2012:381). During a data presentation session, scrutinising the data may lead to fruitful discussions that eventually lead to improvement in quality-check processes (Braa, *et al.*, 2012:381). When collecting data, in order to minimise human error there need to be built-in control measures to eliminate possible errors, whether it is manual and/or on computer (WHO, 2003:6), which the District Health Information Systems (DHIS) has.

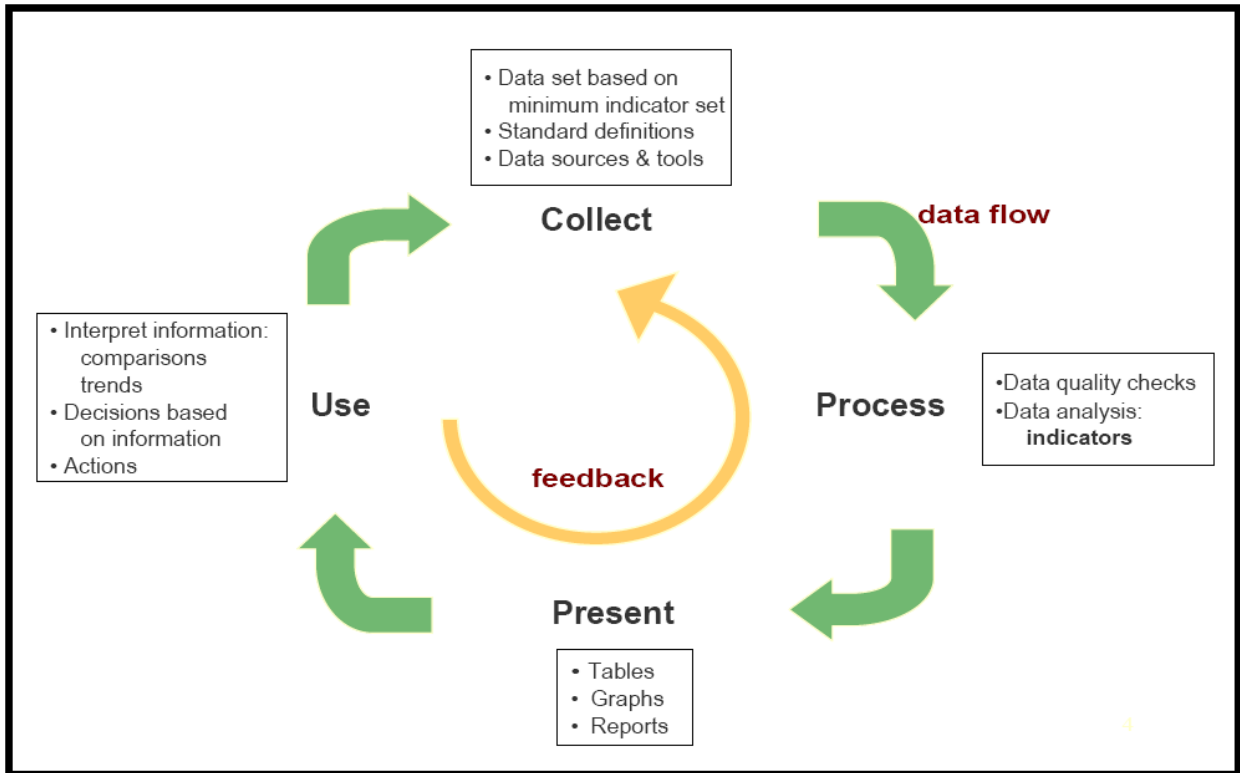
According to Mate *et al.* (2009:4), data collection at the facility before data are captured into the DHIS is a point of major breakdown that compromises data quality because the data capturers capture what is recorded by clinical staff and may only scrutinise clinical data to a certain extent, so mistakes made by clinical staff may end up being captured to the DHIS (Mate, *et al.*, 2009:4). Data on the paper registers, such as monthly summary sheets, and what is captured in the DHIS differ, either due to human typing error, omission of registers or because of lost or missing registers (Mate, *et al.*, 2009:4). Duplication of data is one of the major concerns (Mate, *et al.*, 2009:4).

#### **3.4.3.2. Poor and lack of feedback**

However, participants' also agreed that as data are submitted, the feedback sent back to the facilities, if any, is poor.

*'There is no feedback to lower level about their data, in fact, we need a data mop-up.'*

As data are submitted in one direction, feedback should also be provided in the opposite direction (Garrib, *et al.*, 2008:550). Facility staff are supposed to understand, interpret and analyse their collected data; and display selected indicators with relevant graphs as a form of monitoring (Garrib, *et al.*, 2008:550).



**Figure 3.6** Routine Data Handling/Information Management Process.

(Source: Heywood & Rohde, 2001)

In an ideal situation, PHC facilities must submit data to the district information management (The Department of Health, 2009:6). The Department of Health strongly emphasise the provision of quality data by the facilities, because poor quality data are regarded to have the potential of misleading the entire system if submitted (The Department of Health, 2009:6).

The facility manager has a definite responsibility of ensuring the collection of all data elements, and other staff involved in any stage of the information cycle should understand the definitions of data elements. Furthermore the PHC supervisors should check and support the facility in the process (The Department of Health, 2009:6).

### 3.4.4. Measures to improve and/or strengthen data management

#### 3.4.4.1. Training and development

The participants have indicated the need for training and development of staff. This need was further broken into these sub-themes; health programme managers should train facility staff on their specific programmes and nurses should receive training on data management, including capturing data on DHIS.

According to Nicol *et al.* (2013:788) training is also lacking at facility level, and data quality checking skills are often a 'luxury' for facility staff and the value of the data collected is not understood either.

Computer systems are useful in data collection. However, potential incorrect entries through input errors may be increased by computer use. Common computer system errors may include finger error, such as hitting a wrong key on the keyboard, wrong selection of items on the screen by the mouse or touchpad, or just incomplete capturing of data collected (Hebda & Czar, 2013:63). Amongst others, measures can be taken to minimise the likelihood of input errors, such as educating personnel, conducting system checks and data verification (Hebda & Czar, 2013:63).

##### *3.4.4.1.1. Health programme managers should train facility staff on their specific programmes*

Training in data management was pointed out as a need at different levels in order to improve data management. Health programmes must be explained and training should be provided on their data elements. Participants indicated a need for training of both clinical and information staff on data management, including software capturing.

*'We need support visits from District, because they only send documents and there are some that we don't understand. We only see them in the facility when someone from the Province or National is coming.'*

*'If only the very data capturers in the facilities could have in-service training on data quality regularly, it can make a difference. They are still young and they have potential'*

Collaboration between different professionals involved in HIS, such as health programme managers, clinicians, facility managers, health information officers and software developers is vital. Software developers gain insight into new requirements in terms of configuration; negotiations can also be done with health programme managers to reduce data elements (Braa, *et al.*, 2012:381-382).

#### *3.4.4.1.2. Train nurses on data management, including capturing data on DHIS*

The participants suggested that having only a data capturer with the knowledge of capturing in the DHIS capturing is not enough. Also, the nurses should be trained in using the DHIS so that they can capture data when the data capturer is absent and it will also make it easier for the operational manager to supervise the data capturer if they understand what is going on in the DHIS software. When the data capturer is on leave, data work piles up and data are submitted late. There is a need for the training of nurses on DHIS to be able to submit data when the data capturer is absent.

*'When you check the skills audit you don't find anything related to information management.'*

*'Data are not analysed for action at facility level, facilities expect the District to feedback information.'*

According to RHINO (2003:49), in order to sustain the HIS skills, reports encourage training of health professionals, such as nurses, rather than training people with IT qualification in HIS. This is due to the fact that health professionals tend to remain in the

health profession and/or industry rather than IT people, who turn to find greener pastures in the IT industry.

Hands-on workshops improve computer skills in using DHISS (Braa, *et al.*, 2012:382). These practical workshops support the hypothesis that ‘the more data are used, the more data quality will improve’, which can lead to improved HIS and breaking the vicious cycle of non-use and poor data quality (Braa, *et al.*, 2012:382). Data collection and capturing skills, as well as knowledge play an important role in data quality and monitoring of programme progress. Hence, educating the data collector and capturer is therefore one of the effective steps towards improving data quality (ESI, 2012:28, Kmietowicz, 2004:328).

#### *3.4.4.1.3. Feedback from upper(managerial) level to lower(operational) level, especially the facility*

Professional support visits which can also fill the feedback gap from upper (such as district office) to lower levels, (such as the facility) are a critical practice in HIS, as facilities tend to learn and get motivated through these visits (RHINO, 2003:49).

#### **3.4.4.2. Procurement of resources**

Information and communication technology-related challenges, such as a lack of computers in facilities, was reported to contribute to the poor data issue.

ICT-related barriers include limited/lack of access to power sources (electricity), Internet connectivity challenges, procurement of appropriate computer hardware and software, inadequate technical support and training of staff on ICT (Sensmeier, 2011:233).



### 3.4.4.3. Web-based DHIS and mHealth

The need for a web-based DHIS system was indicated by participants, especially at the District, because they would remotely monitor the data as it is captured and also retrieve it quickly when needed.

*'If the data were captured directly online, maybe things would be better.'*

Appropriate access to the Internet could enhance the timely transfer of data (Sensmeier, 2011:233). The current information age cuts across all sectors, even healthcare, making good data management become one of the priorities in organisations and/or facilities (Hebda & Czar, 2013:65). According to the Department of Health, the improvement of infrastructure and connectivity will pave way for webDHIS software and this is one of the planned interventions for the eHealth strategy (Department of Health, 2012c:22)

According to Leon and Scheinder (2012:24), mHealth is the use of mobile phone technologies in health services. This has been reviewed for data collection, monitoring and evaluation and even staff productivity. The technology has been found to be useful for capturing data and for monitoring and evaluation in health services, especially in a country with advanced mobile phone and Internet industries, like South Africa.

'In public health facilities in South Africa, routine data are mostly collected on paper, but in more resourced environments healthcare providers may capture data directly into databases during patient encounters' (ESI, 2012:28). According to the Department of Health because of the increased headcounts in the PHC, data quality will remain poor where there is a usage of paper-based systems, even if it is a mix of paper and computerised systems (Department of Health, 2012c:21) Health facility data are mainly collected by healthcare providers by either tick-sheets or tally-sheets during clinical consultations with the patients; as well as by data clerks through the use of specific data collection tools to summarise relevant data from available patient records as recorded by the health professional (Department of Health, 2011a:7).

#### 3.4.4.4. Improve validation process

The need to improve validation processes by managers in facilities and also PHC supervision managers

*'The assistant managers should also check the registers when they do supervision at the facilities.'*

*'I think at the facilities the OPM just sign off the data without checking.'*

For discussions on poor validation processes see 3.4.3.1.

#### 3.4.4.5. Database technical support at District and sub-District levels

Participants raised the need for database technical assistance; some challenges experienced with the DHIS software needed the attention of a database manager. The DHMIS policy agrees with the need for database managers in the provinces, as it can also assist with support to the District (Department of Health, 2011a:32).

*'The DHIS keeps crashing in some computers. Sometimes it stops working and we have to uninstall and re-install the software.'*

*'Database maintenance at District and sub-District level is needed, plus updates on antivirus on DHIS computers.'*

According to RHINO (2003:37), electronic systems such as software, are regarded complex in nature. It is pivotal to have a sustainable and proper working relationship between users of the software and the software development team. Of course, current Information Technology (IT) does move and manipulate large amount of data, however,

it is not as proficient in dealing with ambiguity in structure and semantic content of the data (Sensmeier, 2011:233).

#### **3.4.4.6. Reduce registers**

The data recording procedure in the registers should also be regarded as important as other procedures, such as reporting or data processing because things that go wrong during recording affect all other data management processes that follow (RHINO, 2003: 39).

#### **3.4.4.7. Recruitment and retainment of more staff**

Participants reported a need for more staff and this could reduce workload and improve data management.

*'Some of the HIS staff that you see in NGOs and the National Department of Health were working in our district before, but they got better offers and left.'*

*'Data management is a programme on its own, it needs staff.'*

In developing countries healthcare has some donor dependence, this includes the HIS domain, which becomes a challenge to maintain after donor support withdrawal. For instance, during this study some of the data capturers in the facilities were from NGOs and this could contribute to further staff shortage in the future, should the staff not be absorbed by the District (Kimaro & Nhampossa, 2007:1).

#### **3.4.4.8. Support from District to facility**

The participants from the facilities have expressed a need to have continuous support from the District. Through this support they could share their data management challenges and ask questions. The need for support from health programme managers was expressed by both clinical and HMIS staff in the facilities. The HMIS staff also expressed a need for support visits from ICT professionals, such as health informatics

practitioners and/or specialists. Participants from the District acknowledged, on the other hand, that they were needed in facilities more than they were able to support the facilities because they had limitations with travel resources.

*'We have limitations in kilometres, given the 17 500km. Imagine if I have to regularly visit Lephale area. Even if I am available, I won't be able to get there often.'*

*'The District staff are always busy.'*

According to RHINO (2003:37), it is critical for the District to be involved in supporting health facility staff. Reports have shown that District inputs, such as choice of indicators, design of registers and report formats, have assisted facilities in improving their data management processes. Studies have shown that facility staff need support and supervision on data management (Mate, *et al.*, 2009:4).

### **3.5. CONCLUSION**

This chapter has covered the description of the data interpretation and procedures, demographic characteristics of the participants and the discussion of clusters, themes and sub-themes.

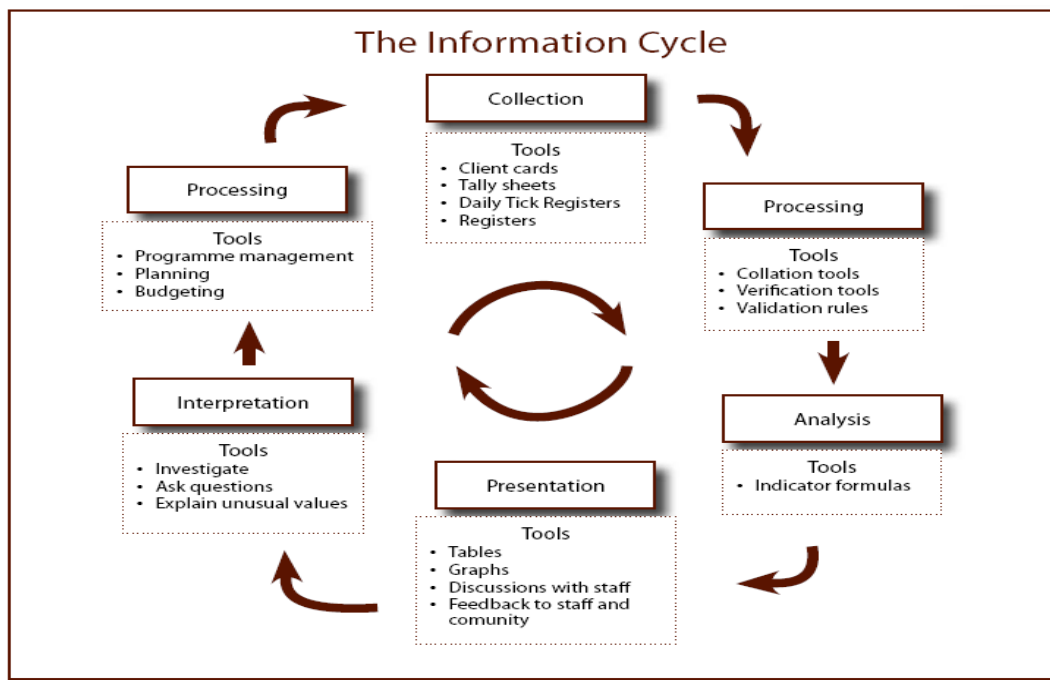
The next chapter will cover the conceptual framework of this study, which includes the hss-Africa framework of HIS, concept map and summary of the findings of this study.

## CHAPTER 4: CONCEPTUAL FRAMEWORK

### 4.1. INTRODUCTION

According to Miles and Huberman (1994:18) conceptual framework 'explains either graphically, or in narrative form, the main things to be studied – the key factors, concepts or variables and the presumed relationship among them'. This chapter discusses the hss-Africa framework of Health Information System (HIS) and points how and where the findings of this study fit in. Also analysis and development of a concept map of the experiences learned in this study, referring to the DHMIS Policy and the Department of Health SOPs for data management.

Figure 4.1 below, the information cycle by the Department of Health (2009:6(3)), outlines the procedures for collection, storage, processing, analyzing, distribution and use of data. This cycle enables one to locate the links between the different phases of collecting data, processing data, analysing data, presenting information and using the information for evidence-based decision making.



**Figure 4.1** The Information Cycle (Source: Department of Health 2009: 6(3)):

**According to HISP-SA (2013:3) the steps in the cycle can be briefly explained as follows:**

- *Data Collection*: What data to collect will be determined by the agreed upon data sets;
- *Data Processing*: Requires good data quality, and involves different methods for ensuring data quality;
- *Analysing Data*: Each facility must assess whether they achieved what they planned to do;
- *Presenting Information*: Allows for the information to be questioned and strengthened;
- *Interpreting Information*: Interpretation involves looking at information and asking what it means;
- *Use of Information*: Every decision made, every action taken and every change made should be guided by information.

#### **4.2. THE hss-AFRICA FRAMEWORK FOR HEALTH INFORMATION SYSTEM**

The hss-Africa aims to assist organisations in designing, implementing, strengthening and using HIS. The hss-Africa framework, as shown in Figure 4.2, was developed according to the President's Emergency Plan for AIDS Relief (PEPFAR) guidelines to strengthen mainly the five components of the HIS (hss-Africa, 2014). This framework will be used to present the results, locating where and how these findings fit in the framework.



**Figure 4.2** The hss-Africa Framework for Health Information System

#### 4.2.1. Data collection, collation, verification and capturing:

- *Tools*

The nurses raised concerns about the number of data collection tools, being the tick registers and the elements. Participants understand the importance of recording for health programmes, but they question the amount of elements. This is addressed by DHMIS where the elements being the National Indicator Data Set (NIDS) and Provincial Indicator Data Set (PIDS) are reviewed every two years. The ability to review the

elements lies at the NDoH level. In regard to the PIDS, the power to review the elements lies with the province. The District often adds elements to the list, but it is small in comparison to what the NDoH and the provinces add. In some provinces they do not even have PIDS, so the burden of data elements comes from the NDoH.

- *Data processes*

According to the findings in this study, there was consensus amongst the participants (irrespective of their place of work) that the area where data quality can be compromised is at the facility level during the process of data collection and data capturing. The collection of data is done by health professionals, usually the nurses, who attend to patients and record data in the registers. The data capturers then capture the data from the source, being the register, onto the database, which is mainly the DHIS.

#### **4.2.2. Data transmission:**

- Standards, messaging and data transfer/interchange

The study has revealed challenges with the transmission of data, which is done manually from USB flash drives to the next level, not electronically through the Internet and/or emails. Computer viruses from using flash drives can also lead to data loss.

#### **4.2.3. Data processing, analysis and presentation:**

*Including reports for:*

- Disease and programme management

Health programme managers receive, amongst others, data for their programme responsibilities from the facilities through the information unit. At this level, receiving data that are of good quality is critical, all data quality characteristics, such as timeliness, completeness, validity and others affect and impact on the work of this directorate. The focus of monitoring and evaluation has shifted from upward reporting towards using information or data for health programme improvement (ESI, 2012:11); hence health performance data and information can be regarded as critical in today's monitoring and



evaluation.

- Facility management

There is no allocated time for data management for the staff. The facility manager should have an official allocated time for data management, such as 5/8 hours in a week. This affects the facility managers in particular, but not exclusively.

#### **4.2.4. Resources for health management information systems:**

- Staff

The nurses outlined their challenges with the workload because of staff shortage.

- Hardware

The data capturers have also indicated a lack of resources, especially sufficient computers, Internet to be able to submit data electronically, challenges with viruses and technical support with the database.

- Software

Challenges with the DHIS software crashing were also indicated. In this case the DHIS stops functioning properly or stops functioning completely and sometimes even freezes.

- Costs/budget

Although costs may be a reason for some of the challenges, this study did not explore this area.

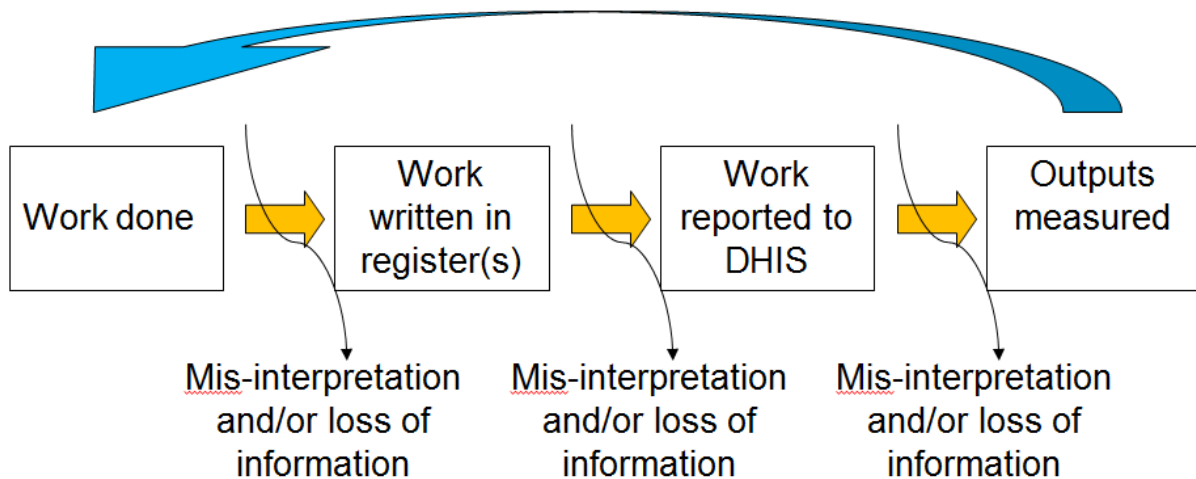
#### **4.2.5. Organisational rules:**

- Processes and procedures

The National Department of Health (NDoH) acknowledges the need for policies and standard operating procedures (SOPs) in the country's Routine District Health

Management Information System (DHMIS) and anticipates improvements in data quality resulting from proper implementation of the policies and SOPs (Department of Health, South Africa, 2012a:2).

Analysis also shows that at the facilities, the major breakdown is before data are captured in the DHIS. This may be due to numbers being incorrectly tallied, missing and/or neglected registers and failure to include all relevant registers (Mate, *et al.*, 2009:5). Data may be mis-interpreted or lost in the process of being recorded in writing in the register, captured in DHIS or during the process of measuring outputs, the following diagram shows possible misinterpretation and/or loss of data:



**Figure 4.3** The Possible Misinterpretation and/or loss of Information. (Sourced from presentation by: Moleko, W 2012:21)

- Data security

This study did not cover this area.

- Confidentiality and privacy

This study did not cover this area.

- System maintenance

System maintenance-related issues were raised by participants in terms of database maintenance and other information communication technology (ICT) support for the DHIS.

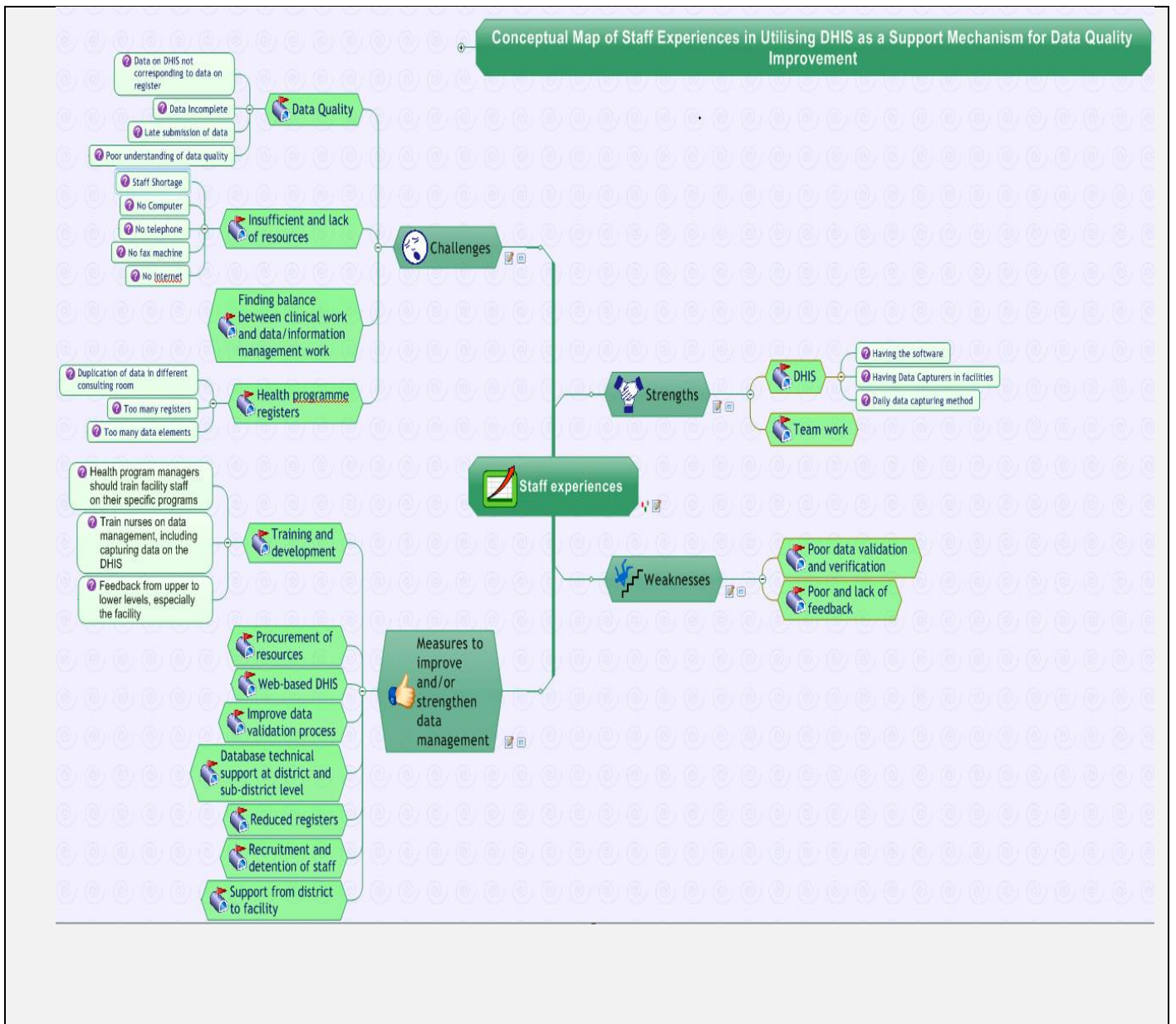
- Information culture, such as:
  - Change of management during implementation of new systems
  - Project management
  - Communication with all role-players and stakeholders
  - Raising awareness and advocating for increased data quality and data use

The staff mentioned the fact that since the HIV/AIDS epidemic, there has been change in data management needs, but not much has been done in the nursing care to accommodate this change.

#### **4.3. CONCEPT MAP AND SUMMARY OF THE STUDY FINDINGS**

Holloway and Wheeler (2010:338) define concept as 'an abstract or generalised idea that describes a phenomenon' and concept mapping as 'linking and relating concepts and presenting the relationship in a diagram.'

The following concept map represents the findings of this study in which the staff experiences are divided into four main classifications; namely, the strengths, weaknesses, challenges and measures to improve and/or strengthen data management. These classifications are further broken down accordingly.



**Figure 4.4** Concept Map Summarising the Staff Experiences in utilising the DHIS for Data Quality Improvement

#### 4.3.1. Challenges

The challenges experienced by the participants are mainly in data quality, resources, imbalances between clinical and data management work and the health programmes registers. Data quality challenges included the discrepancies found when comparing data in the register and in the DHIS; incompleteness of data when needed for use for

health programme analysis; late submission of data by lower levels and the perceived poor understanding of data quality, especially at facility level.

Insufficient and lack of resources exist, such as human resources, especially the clinical staff and insufficient and/or lack computers, telephones and/or fax machines for real time communication between levels, internet for electronic submission of data and USB flash drives.

Finding balance between clinical work and data management was a challenge faced by clinicians in the facilities. The participants described the pressure from long queues and reducing waiting times to be contributing to less time given to data management, while the health programme registers are many.

#### **4.3.2. Strengths**

There were strengths outlined in the current system, especially having data capturers based at the facilities and having the software, because work is being done despite the challenges. Facilities that have activated the DDC on their database have also seen this practice to be a strength, and those not using it have expressed its need.

#### **4.3.3. Weaknesses**

The data validation and verification processes were reported to be poor, especially on the registers when counting the running totals. Poor and lack of feedback was reported from managerial level (District office) to the operational level (facilities) during the data flow process.

#### **4.3.4. Measures to improve and/or strengthen data management**

The participants suggested measures to improve and/or strengthen data management, especially the training and development of staff, staff recruitment and retention, and procurement of resources, such as computers and review of data elements to reduce registers and elements. Other measures suggested were web-based DHIS software,

improved data validation processes, consistent support from District to facility and database technical support.

#### **4.4. CONCLUSION**

Based on the hssAfrica framework for HIS, all components are in place, at least the ones this study has focused on. However, the participants' experiences have described some gaps in the system. The current good practices can be strengthened as well. The suggested measures can be implemented as per relevant policies according to order of priority.

The DHMIS policy signed off in July 2011 by the National Department of Health (2011a:1), which can be regarded as a remarkable step in the history of development of strong HIS in South Africa, can be applied in the current circumstances of the system to achieve data quality goals. However, unless this policy is properly implemented, some, if not all, current challenges in data are likely to persist and even multiply.

Despite the current progress, there is still significant need for data quality improvement within the routine data systems with respect to accuracy, completeness, timeliness, accessibility and quality of data collected, taking into consideration the concerns raised by programme and health managers about the lack of analysis and use of information (Mate, *et al.*, 2009:4; UNAIDS, 2010:69).

This chapter has discussed the framework for health information systems, concept mapping and the summary of findings. In the next chapter, conclusions are drawn by the researcher, and a discussion of the limitations of the study, its relevance and recommendations are presented for further research.

## CHAPTER 5:

### CONCLUSIONS, LIMITATIONS, RELEVANCE AND RECOMMENDATIONS

#### 5.1. INTRODUCTION

The previous chapter covered the conceptual framework, including the hssAfrica framework for HIS and the summary of the research findings of the current study with related literature. This chapter presents conclusions, limitations, relevance and recommendations of the study, as well as final discussions in this study as outlined by Burns and Grove (2009:576).

It is evident that the South African Department of Health does regard health information systems as a critical component of the health system. The three figures, 5.1, 5.2 and 5.3, outline some of the Department's plans, goals and priorities that relate to health information systems, including data quality.

The twelve priority areas identified by the South African Government, together with the corresponding key indicators and targets for 2010 – 2014 (The Republic of South Africa, 2012:82) serve as an indication of a demand for a strong HIS. These outputs and corresponding outputs are presented in Table 5.1. (The Republic of South Africa, 2010:82).

**Table 5.1** Four strategic health outputs and sub-outputs of the NSDA

1. Increasing life expectancy
2. Decreasing maternal and child mortality
3. Combating HIV and AIDS and decreasing the burden of disease from tuberculosis (TB)
4. Strengthening health system effectiveness
4.1. Re-engineering of PHC system
4.2. Improving patient care and satisfaction

- 4.3. Accreditation of health facilities for compliance
- 4.4. Improved health infrastructure availability
- 4.5. Improved Human Resources (HR) for health
- 4.6. Strengthening financial management (monitoring and evaluation)
- 4.7. Improving healthcare financing through implementation of National Health Insurance (NHI)
- 4.8. Strengthening Health Information System (HIS)

The Output 4 (strengthening health system effectiveness), which include sub-output 4.8. (Strengthening HIS) forms the foundation for achieving outputs 1 to 3 (English, *et al.*, 2011:4). Therefore, it becomes evident that data quality which is achieved through HIS has the potential and may contribute to achieve the set health priorities.

The national strategic plan for the Department of Health (2014b:14) has a national development plan (NDP), priorities and goals for health information:

**Table 5.2** Health information systems in National Strategic Plan 2014/15 – 2018/19

NDP Goals 2030	NDP Priorities 2030	NDoH Strategic Goals 2014 - 2019
Health systems reforms completed	Improve health information systems	Develop an efficient health information system for improved decision making

The annual performance plan (APP) of the NDoH (2014a:40, 47) has programmes that are aimed at health information systems:

**Table 5.3** Health information systems in annual performance plan:

Programme	Sub-programme	2014/14 Target
Programme 2: National Health Insurance, Health Planning and systems enablement	Health Information Management, Monitoring and Evaluation	Integrated Patient Based Information System developed



This study addressed its purpose by exploring and describing the experiences of staff members in the District Office, sub-District Office and PHC facilities in managing data and/or information by asking open-ended questions. The participants in this study were all working at either PHC facilities and/or District Office.

A qualitative research design, exploratory, generic and descriptive study was conducted. Data were collected from health programme managers, PHC facility managers, clinical nurse practitioners and health information officers from the Waterberg District in Limpopo during the months of May and August 2014 using an interview guide. Thematic analysis of the qualitative data was interpreted in the preceding chapters.

## **5.2. PRESENTATION OF THE CONCLUSIONS AND UNDERSTANDING DEVELOPED BY THE STUDY**

### **5.2.1. Description of experiences of staff who manage and/or use data on health programmes**

Participants' experiences indicated that data were indeed generated at the facilities, submitted to the sub-District and then to the District Office and also confirmed the use of the DHIS. The presence of data capturers and having the software for data management was a strength highlighted by most participants. However, there were challenges experienced by staff at both district and facility levels. These challenges included the data on the DHIS not corresponding with data on the source documents, data quality issues, such as incompleteness, late submission and poor validation, poor feedback and shortage of human and technical resources. Training and development needs of staff were also highlighted and the need for proper implementation of the health information policies. The training and development needed include data management, DHIS software (basic and advanced), monitoring and evaluation of health programmes.

### **5.2.2. Identification of the strengths and weaknesses of current data management processes as experienced by staff working with data**

The data capturers who are based at the facilities and the software (DHIS) were indicated as strengths by most participants. Other strengths included teamwork amongst staff members. Participants indicated that even if there are gaps in the system that need to be addressed, work is being done and there are data available for use.

The general weaknesses pointed out were the shortage of resources (human and technical). Shortage of clinical staff was reported to be causing increased workload since have to also reduce long waiting times in the facilities, and the shortage of resources, such as computers and internet access, contributing to the late submission of data because one computer has to be used for both DHIS and Tier.Net and data are also submitted by USB flash drives. Participants indicated that submission of data through the internet would be the most appropriate and would assist with timeliness in data submission from lower to upper levels, such as facility to district, and even district to province.

There were challenges raised concerning the health programme registers. This includes registers having data elements that are not being collected but appear on the registers and some of those that are collected are not included in registers. This leads to staff having to manually add elements on the register and some staff forgetting, resulting in data loss and/or miscalculations of running totals on the registers.

Some challenges were unique, depending on the level in the organisation. The staff at the facilities expressed a need for staff, computers, training and imbalance between clinical and data workload. The staff at District, mainly the health programme managers, expressed data quality concerns, such as late submissions, lack of data verification and validation, and data discrepancies. However, the challenges raised at facility and District level are interrelated.

### **5.2.3. Identification of key barriers in the DHIS utilisation**

The DHIS has been a central component of the District Health Information Management System (DHMIS) (Department of Health, 2011b:3; Muschel, 1999:147).

Most participants, irrespective of whether they were based at facility or District Office, pointed out the need for training and development in data management. The data capturers were the only staff members that could capture data on the DHIS, making it difficult for the facility managers to submit data when data capturers are on leave. It was pointed out that should staff members at a facility be trained in computer literacy and eventually working with the DHIS software, it would assist with data management work in the absence of a data capturer and it would also aid facility managers in supervising the data capturers.

Participants indicated the need for database technical support in DHIS software. They outlined that they sometimes experience problems that need attention from professionals with software development knowledge to assist and it is difficult to get such assistance, especially at facility level. The need for review and standardisation of data collection tools was highlighted, especially at facility level where data are generated.

#### **5.2.4. Recommendations on how data management can be strengthened**

The recommendations found in literature are similar to those made during conversations with the Department of Health and support partner staff members. Although high level documents provide the basis for implementing the recommendations, this study provides evidence that the challenges are still experienced in spite of policies, strategies, guidelines and standard operating procedures.

There are specific recommendations to address the challenges resulting in poor data quality. These challenges and corrective actions are interrelated and need to be implemented as an integrated approach.

5.2.4.1. Data quality challenges and weaknesses identified include data in DHIS not corresponding to data in registers, incomplete data, late submission of data, poor understanding of data quality, insufficient data validation and a lack of feedback. Recommendations to address these data quality challenges include:

- Data quality should be a standing item in all management meetings, even at facility levels for continuous quality improvement of data, including review of data collection tools and data management processes.
- Official time should be allocated for data management at facilities, especially for facility managers who need around five hours per week to lead and monitor data management processes and data quality.
- Developing the knowledge and skills of all staff categories involved in data management will address several challenges, resulting in poor data quality (see below for specific skills development recommendations).
- Register rationalisation: Discussions with participants indicated that differences between data in registers and in the DHIS are mainly caused by multiple registers (sometimes up to 54 data collection tools in one PHC facility). Registers should be reduced and all data to be captured into the DHIS should be collected by means of standardised Tick Registers.
- Upgrade to the web-based DHIS: Informal discussions with data managers indicated that differences between data in the DHIS at different levels are often caused by incorrect export and import practices. Training, mentoring and support should address some of these challenges but the upgrading to the webDHIS will be the most effective strategy to ensure data values at all levels are the same. Use of the web-based DHIS (and especially daily data capturing (DDC) identified as a strength by the participants) will prevent late submission and also reduce the data flow time lines (currently, 45 days from facility level to NDoH as per the DHMIS policy and SOP) to theoretically 24 hours, depending on sign-off policy. It will also reduce the need for database management support identified by the participants because the webDHIS will be managed centrally by experts.
- Implement standardised data validation processes: Implement pre-submission data validation processes to be implemented monthly at District, sub-District and facility levels.
- Provide feedback on data quality and health programme / service progress.
  - Create standardised, user-friendly facility and District-level feedback forms and graphs to reduce time required for feedback.

- Adding feedback on meeting agendas (at all levels) will also provide opportunities for discussing challenges and sharing good practices at all levels. See SOPs and DHMIS policy.

5.2.4.2. Challenges identified in terms of HIS resources include staff shortages (healthcare providers, HIS and IT staff), inadequate infrastructure, connectivity and equipment, such as computers, telephones and fax machines. Recommendations to address these challenges include:

- Development of staffing norms for healthcare providers, HIS and IT staff;
- Development of standards and minimum requirements for hardware, software and other equipment;
- Implementation of eHealth strategy in terms of connectivity;
- A help desk with knowledgeable and skilled staff will reduce technical and IT support turnaround time.

5.2.4.3. The challenge in terms of finding a balance between clinical work and data / information management will be reduced by the above recommendations, but the following will also assist:

- Role clarification and standardised job descriptions specifying data quality improvement support activities for health care providers, HIS and IT support staff;
- Implementation of SOPs at facility, Sub-District office, District office and Provincial office;
- Support from District Information Officers to sub-District and facility HIS staff.

5.2.4.4. Challenges in terms of health programme registers were described as duplication of data in different consulting rooms, too many registers and too many data elements. The following are recommended to mitigate these challenges:

- Rationalisation of data collection registers;
- PHC Tick Registers to contain all NIDS data elements and/or be the only source of PHC DHIS data;

- Standardisation of PHC Tick Registers and distribution to all facilities before NIDS are implemented after two yearly reviews (DHMIS policy).

5.2.4.5. HIS knowledge and skills may be crucial to the improvement of data quality. The following recommendations will assist in addressing the skills needs of healthcare and HIS staff:

- Incorporation of data management for health professionals and short courses (Rohde, *et al.*, 2008:13);
- Development of standardised needs-based in-service training programmes (based on core competencies needed for doing the work specified in the job descriptions) for the following categories of staff involved in data management:
  - Data collectors (healthcare providers)
  - Data capturers
  - Information managers and officers at facility, sub-District, District and higher levels
  - Line and program managers (as users of data / information for evidence based decision making);
- Development of a HIS career path / formal qualifications for the above categories of staff (DHMIS policy). According to South African Health Informatics Association (SAHIA) (2014) there is no undergraduate training for health informatics in South Africa. The UNISA DHIS2 Foundation course, developed in collaboration with HISP-SA, is a first step in this direction (Computing Bits, 2014:5);
- Allocation of ring-fenced budgets for HIS training, mentoring and support.

### **5.3. FURTHER PRACTICAL RECOMMENDATIONS, DESCRIPTIONS AND EXAMPLES OF ACTIVITIES THAT CAN IMPROVE DATA QUALITY FOR A DHIS USER IN LINE WITH THE FACILITY SOP (Department of Health, 2012b:11):**

#### **5.3.1. During data collection**

- Use of standardised, user-friendly tools, limited number of forms and register;

- PHC headcount only collected at reception desk;
- Use of PHC tick register, ensure patient number is correct, tick relevant needs and relevant services provided and check that ticks are in correct columns;
- Conduct a rapid data quality assessment, by visual scanning, must be 100% complete with no gaps, spelling errors, duplicates or outliers without comments before submission;
- Calculate daily sub-totals and carry overrunning totals, including recount and/or verification of data;
- Sign off data submission reports.

### **5.3.2. During preparation of data capturing**

- There must be a standardised activation of relevant data elements of healthcare facility.
- Collect all relevant data summary tools, for instance, tick registers in case of DHIS DDC.
- Conduct a rapid data quality assessment, by visual scanning, of data on data input forms (tick registers), must be 100% complete with no gaps, spelling errors, duplicates or outliers without comments and check signatures.
- Arrange most suitable capturing times with healthcare providers, for example, end of day, early morning or during tea/lunch times. This ensures that clinicians are with tick registers during consulting hours.

### **5.3.3. During data capturing**

- Selection of correct date, consulting room/facility and data set;
- Verification of minimum and/or maximum validations;
- Marking of potential errors by checking appropriate check box;
- Follow up discrepancies found in data with relevant service point. Keep record of follow up date and person. A line should be drawn through incorrect values and new values should be written. No correction fluid should be used. Entire data trail back to the initial service point must be corrected, correct values in DHIS.

### 5.3.4. After data capturing

- Run validation of the following reports per service point and verify data with clinician, namely; minimum and/or maximum (min/max) range violations, absolute validation and statistical validation reports.
- Run standard reports for completeness, outstanding input forms, routine raw data reports and ad hoc reports.
- Continuously give feedback on data quality, by data capturer to clinical staff
- Develop and implement data quality assurance plan. Use a standardised quality report, which lists number of gaps, unverified outliers, and validation rule violations for the reporting period and proposed plan of how data quality issues would be addressed.
- Make backup of data files once capturing is done
- Improve security of DHIS data to ensure that no data are lost due to technical malfunctions or theft of equipment and no unauthorised modifications of data through illegal external access (cracking) or managerial manipulation.
- Attach sign-off form to DHIS reports as proof of data quality (data entry validation report, min/max violations, outstanding input forms, Pivot table of raw data).
- File summary forms and data collection tools in safe area.

### 5.3.5. How the tick register data may be collected, summarised and captured into the DHIS

#### 5.3.5.1. Reception headcount tick register:

- Indicate each patient once a day, irrespective of the number of services/interventions provided to the patient.
- Start on a new page of the register every day.
- Calculate total headcount for every day and indicate clearly in register (double check).
- In small facilities and/or facilities seeing only a few patients a day, one line can be left open after total for the day and new date can be written in the middle of next row.



- Based on facility procedures, sub-totals from reception headcount registers are captured daily into the DHIS or on weekly summary forms which are calculated and transferred to the monthly summary form.

#### 5.3.5.2. *PHC tick register:*

- Indicate patient file number clearly on PHC tick register.
- Tick required data in line with the NIDS definitions directly on the PHC tick register during or directly after a patient visit. This should be done before the next patient is seen.
- Double check that all the correct data elements and correct columns were ticked for healthcare interventions provided to a patient.
- Calculate and sign sub-totals clearly every day.
- Based on facility procedures, sub-totals from PHC tick registers are captured daily into the DHIS, or on weekly summary forms which are calculated and transferred to the monthly summary form.

## 5.4. IDENTIFICATION OF STUDY LIMITATIONS

This study had the following limitations:

- The study only focused on PHC facilities; it would have been beneficial to also explore the district hospital information aspect of this study.
- Selection of the few facilities was based on convenience sampling and may not have been representative of general health services in the Waterberg District.
- From the district level, the study included health programme managers and information officers. Other managers, such as finance, supply chain and human resources could also have been included, as these managers could have provided responses on the reasons for staff shortage and procurement of resources, as well as cost factors as per the hss-Africa framework for HIS.

Despite the limitations listed above, it was, however, reassuring to the researcher that the findings of this study do tally with those presented in other national and international publications.

## **5.5. DISCUSSION OF THE RELEVANCE OF THE STUDY**

The study will add to the 'Rapid Information Needs Assessment: District Health Information' conducted in 2011 by the National Department of Health in South Africa. It explores and describes the experiences of staff members with the aim of providing input to the development of quality improvement plans for health information systems, strengthening in different levels of the public health system. It also indicates the areas of the DHMIS policy that are not implanted yet and/or properly and the constraints in adherence to the SOP.

This study has focused on information management at both facility and District Office; this may be a useful description of the data and/or information management and may serve as an input to current interventions of improving data quality in the District, including feedback between District and facilities.

## **5.6. RECOMMENDATIONS FOR FURTHER RESEARCH**

A rapid evaluation study of the District Health Management Information System in the entire province of Limpopo with a mixed-method approach can be useful.

Also, the following study objectives may be useful to a medical/health informatics researcher:

- To determine competencies needed by different levels of HIS staff and assessment of those skills.
- To determine the reasons for repeated recommendations not being implemented by the Department of Health.

## 5.7. CONCLUSION

The researcher has met the objectives of the study. In conclusion, the experiences of the staff in using the DHIS as a mechanism for quality improvement calls for sustainable multi-disciplinary support for the facility level where data are generated, in improving data quality.

The main recommendation is the further and proper implementation of the DHMIS policy, the standard operating procedures (SOP) and the eHealth strategy. The policy addresses most of the challenges raised by participants and it has the following key provisions: health information coordination and leadership, indicator data sets, data management, data security, data analysis and information products, data dissemination and use and District Health Management Information System resource requirements. The SOPs are mandatory and ensure appropriate data and information management at different levels including facility, sub-District and District. The eHealth strategy has already listed most, if not all, basic key principles such as infrastructure, connectivity, basic IT literacy, human resources and affordability planning which may address the challenges and weaknesses found by this study.

This chapter covered the conclusions and understanding developed by the study, identified the study limitations, discussed the relevance of the study and provided recommendations for further research of the study. This is the final chapter of this report.

**LIST OF REFERENCES:**

- AbouZahr, C. & Boerma, T. 2005. Health information systems: the foundations of public health. *Bulletin of the World Health Organization*, 83(8):578-583.
- Braa J., Heywood, A. & Sahay, S. 2012. Improving quality and use of data through data-use workshops: Zanzibar, United Republic of Tanzania. *Bulletin of the World Health Organization*, 90(5):379-384.
- Brockopp, D.Y. & Hastings-Tolsma, M.T. 2003. Fundamentals of nursing research. 3rd ed. Boston, Mass.: Jones & Bartlett.
- Burns, N. & Grove, S.K. 2005. The practice of nursing research. 5th ed. St. Louis, Mo.: Elsevier Saunders.
- Burns, N. & Grove, S.K. 2009. The practice of nursing research. Appraisal, synthesis and generation of evidence. 6th ed. St. Louis, Mo.: Saunders Elsevier.
- Byrne, E. & Sahay, S. 2003. Health information systems for primary health care. thinking about participation: thinking about participation. *Proceedings of the IFIP*, 9:237-249
- Computing Bits. 2014. *Newsletter*. Pretoria: Unisa: School of Computational Sciences.
- Cresswell, J.W. 2009. Research designs: qualitative, quantitative & mixed methods approaches. 2nd ed. Thousand Oaks, Calif.: Sage.
- De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. 2011. Research at grass roots: for the social and human service professions. 4th ed. Petoria: Van Schaik.
- Dyson, S. & Norrie, P. 2010. Fundamental aspects of research for nurses. London: Quay Books.

English R., Masilela T., Peter Barron P. & Schönfeldt A. 2011. Health Information Systems in South Africa. South African Health Review. Durban: Health Systems Trust.

English, R.G. 2011. A rapid evaluation of routine primary health care data management systems and flow within the district health system in the Western Cape Province, South Africa. MMed Dissertation. University of Cape Town. Cape Town

Enhancing Strategic Information (ESI). 2012. Evidence based health management manual. March 2012 Version. USAID. Enhancing Strategic Information Project (ESI).

Garrib, A., Stoops, N., McKenzie, A., Dlamini, L., Govender, T., Rohde, J. & Herbst, K. 2008. An evaluation of the district health information system in rural South Africa. *South African medical journal (SAMJ)*, 98(7):549-552.

Harman, B.H. 2006. Ethical challenges in the management of health information. 2nd ed. Boston, Mass.: Jones & Bartlett.

Health Information System Program – South Africa. 2013. Data Management: Orientation for New Staff. Power Point Presentation (Unpublished)

Health Information Systems Program – South Africa Home page. 2014 From <http://www.hisp.org> Date of access: 9 November 2014.

Health Information Systems Program - South Africa. 2013. Introduction to Rapid Internal Performance Data Audit (RIPDA). Eat London: Health Information Systems Program.

Health Systems Strengthening Africa (hss-Africa). 2014. Health informatics solutions. <http://www.hss-africa.org/informatics.htm> Date of access: 24 August 2014

Hebda T.L. & Czar P. 2013. Handbook of Informatics for Nurses & Healthcare Professionals. Pearson

Heywood, A. & Rohde, J. 2001. Using information for action: a manual for health workers at facility level. Arcadia, Pretoria: Equity Project.

Holland, K. 2010. Research evidence: qualitative methodologies and methods. (*In* Holland, K. & Rees, C. Nursing: evidence-based practice skills. Oxford: Oxford University Press.)

Holloway, I. & Freshwater D. 2007. Narrative research in nursing. Oxford: Blackwell.

Holloway, I. & Wheeler, S. 2010. Qualitative research in nursing and healthcare. 3rd ed. Ames, Ia.: Wiley-Blackwell.

Houser, J. 2008. Nursing research: research, using and creating evidence. Boston, Mass.: Jones & Bartlett.

Institute for Health Care Improvement. [Sa]. The Data Improvement Guide. A curriculum for improving the quality of data in PMTCT (Draft). Unpublished.

Issell, M. 2009. Health program planning and evaluation: a practical, systematic approach for community health. Boston, Mass.: Jones & Bartlett.

Johns Hopkins University & Edwards, M. 2006. Routine health information systems: concepts and methods. [http://ocw.jhsph.edu/courses/fundamentals\\_programevaluation/PDFs/Lecture8.pdf](http://ocw.jhsph.edu/courses/fundamentals_programevaluation/PDFs/Lecture8.pdf) Date of access: 23 August 2014.

Kerr, K. 2006. The institutionalisation of data quality in the New Zealand health sector. Auckland, NZ: University of Auckland. (Thesis - PhD.)

Kimaro, H.C. & Nhampossa, J.L. 2007. The challenges of sustainability of health information systems in developing countries: comparative case studies of Mozambique and Tanzania. [Electronic version.] *Journal of health informatics in developing countries*, 1(1):1-10.

Leon, N. & Schneider, H. 2012. MHealth4CBS in South Africa: a review of the role of mobile phone technology for the monitoring and evaluation of community based health services. Cape Town: Medical Research Council and University of Western Cape.

Li W., Bheemavara R. & Zhang J. 2010. Transitive Closure of Data Records. In Chan Y., Talburt J., & Talley T., (Eds), *Data Engineering: Mining, Information and Intelligence*. New York: Springer.

Loveday M, Smith J & Monticelli F. 2006. Health Information Audit Report South Africa. Durban: Health Systems Trust [http://www.hst.org.za/uploads/files/NatHIS\\_audit.pdf](http://www.hst.org.za/uploads/files/NatHIS_audit.pdf)

Massyn, N., Day, C., Dombo, M., Barron, P., English, R. & Padarath, A. 2013. District Health Barometer 2012/13. Durban: Health Systems Trust.

Mate, K.S., Bennett, B., Mphatswe, W., Barker, P. & Rollins, N. 2009. Challenges for routine health system data management in a large public programme to prevent mother-to-child HIV transmission in South Africa. *PLoS one*, 4(5):e5483.

Matsoso, M.P. & Fryatt, R. 2013. National Health Insurance: the first 18 months. Editorial. *South African medical journal*, 103(3):156-158.

Medical Records Institute. 2004. Healthcare documentation: a report on information capture and reports generation. Boston, Mass.: Medical Records Institute.

Miles, M.B. & Huberman, M.A. 1994. *Qualitative data analysis: an expanded sourcebook*. 2nd ed. Beverley Hills, Calif.: Sage.

Moleko, W. 2012. Data feedback towards quality improvement in service delivery. Johannesburg: Wits Reproductive Health and HIV Institute.

Moule, P. & Goodman, M. 2014. *Nursing research: an introduction*. 2nd ed. Belmont, Calif.: Sage.

Mphatswe, W., Mate, K.S., Bennett, B., Ngidi, H., Reddy, J., Barker, P.M. & Rollins, N. 2012. Improving public health information: a data quality intervention in KwaZulu-Natal, South Africa. *Bulletin of the World Health Organization*, 90:176-182.

Muschel, J. 1999. District health information system. *South African health review*: 147-159.

National Evaluation Policy Framework (Draft). 2011. The Presidency. Republic of South Africa. Department: Performance Monitoring and Evaluation.

Nicol, E., Bradshaw, D., Phillips, T. & Dudley, L. 2013. Human factors affecting the quality of routinely collected data in South Africa. *Medinfo*: 788-792.

Pacific Health Information Network (PHIN). 2014. Resources: HIS. <http://phinetwork.org/Resources/HIS.aspx> Date of access: 23 August 2014.

Polit D.F. & Beck C.T. 2004. Nursing research: principles and methods. Philadelphia : Lippincott Williams & Wilkins

Polit, D.F., & Beck, C.T. 2012. Nursing Research. Principles and Methods. 8th ed. London: Lippincott William & Wilkins.

Polit, D.F., Beck, C.T. & Hungler B.P. 2001. Essentials of nursing research, methods, appraisal, and utilisation. 5th ed. Philadelphia, Pa.: Lippincott.

Procter, S., Allan, T. & Lacey, A. 2010. Sampling. (*In* Gerrish, K. & Lacey, A. The research process in nursing. 6th ed. New York: Wiley. p. 142-152.)

Research Methods Knowledge Base website. 2014. <http://www.socialresearchmethods.net/kb/qualval.php> Date of access: 24 August 2014

RHINO (Routine Health Information Network). 2001. The Potomac statement on investment in routine health information in developing countries. Arlington: RHINO.

RHINO (Routine Health Information Network). 2003. Second International RHINO Workshop on: Enhancing the quality and use of routine health information at district level. [http://rhinonet.org/files/2013/04/enhancing\\_the\\_quality\\_use\\_of\\_rhi\\_at\\_district\\_level.pdf](http://rhinonet.org/files/2013/04/enhancing_the_quality_use_of_rhi_at_district_level.pdf) Date of access: 23 April 2014.

Rohde, J.E., Shaw, V., Hedberg, C., Stoops, N., Venter, S., Venter, K. & Matshisi, L. 2008. Information for primary health care. [http://www.hst.org.za/uploads/files/chap13\\_08.pdf](http://www.hst.org.za/uploads/files/chap13_08.pdf) Date of access: 30 August 2014.



Schmidt, N.A. & Brown, J.M. 2009. Evidence-based practice for nurses, appraisal and application of research. Boston, Mass.: Jones & Bartlett.

Sensmeier J. 2011. Transforming Nursing Practice through Technology and informatics. *Nurs Manage* 42(11):20

South Africa. 2003. National Health Act 61 of 2003. *Government Gazette*, 469, No. 26595. Pretoria: Government Printers.

South Africa. 2008. Public Audit Act 2008. Pretoria: Government Printer.

South Africa. Department of Health. 2009. Primary health care supervision manual: a guide to primary health care facility supervision. Pretoria: Department of Health.

South Africa. Department of Health. 2011a. District Health Management Information Systems (DHMIS) Policy. Pretoria: Department of Health.

South Africa. Department of Health. 2011b. Rapid Information Needs Assessment: District Health Information System(DHIS). Pretoria: Department of Health.

South Africa. Department of Health. 2012a. District Health Management Information System (DHMIS). Standard Operating Procedures: Facility Level. Pretoria: Department of Health.

South Africa. Department of Health. 2012b. District Health Management Information System (DHMIS). Standard Operating Procedures: Facility Level.

South Africa. Department of Health. 2012c. eHealth strategy South Africa. Pretoria: Department of Health.

South Africa. Department of Health. 2013. Annual Performance Plan, 2013/14 - 2015/16. Pretoria: Department of Health.

South Africa. Department of Health. 2014a. Annual performance plan. Pretoria: Department of Health.

South Africa. Department of Health. 2014b. Strategic plan 2014/15 - 2018/19. Pretoria: Department of Health.

South Africa. Department of Health. 2010. National Strategic Plan 2010/11-2012/13. Pretoria: National Department of Health.

South Africa. Presidency. 2007. Policy Framework for the Government-wide Monitoring and Evaluation System. Pretoria: The Presidency

South African Health Informatics Association (SAHIA). 2014. Home page. <http://www.sahia.org.za> Date of access: 18 August 2014.

Speziale, H.S. & Carpenter, D.R. 2011. Qualitative research in nursing, advancing the humanistic imperative. Philadelphia, Pa.: Lippincott, Williams & Wilkins.

Statistics South Africa. 2010. South African Statistical Quality Assessment Framework (SASQAF). 2nd ed. Pretoria. [http://beta2.statssa.gov.za/standardisation/SASQAF\\_Edition\\_2.pdf](http://beta2.statssa.gov.za/standardisation/SASQAF_Edition_2.pdf) Date of access: 9 November 2014.

Streubert H.J. & Carpenter D.R. 2011. Qualitative Research in Nursing: Advancing the Humanistic Imperative. Lippincott Williams & Wilkins

Tod, A. 2010. Interviewing. (*In* Gerrish, K. & Lacey, A. The research process in nursing. 6th ed. New York: Wiley.)

Topping, A. 2010. The quantitative-qualitative continuum. (*In* Gerrish, K. & Lacey, A. The research process in nursing. 6th ed. Oxford: BlackwellWiley. p. 129-141.)

Tracy, S.J. 2013. Qualitative research methods: collecting evidence, crafting analysis, communicating impact. Chichester, West Sussex, UK: Wiley-Blackwell.

UNAIDS. 2010. South African Congress report on the declaration of commitment on HIV/AIDS. 2010 Report.

University of North Carolina. 2006. Carolina Population Centre strategies to improve data quality in AIDS, TB and Malaria: measure evaluation. Chapel Hill, N.C.: University of Carolina.

University of South Africa. 2014. Masters and doctoral studies: all qualifications. <http://www.unisa.ac.za/qualificationsMD/> Date of access: 15 August 2014.

Van den Bergh, C. 2009. The District Health Information System (DHIS) as support mechanism for strengthening the health care system. MA (Health Studies) Dissertation. University of South Africa. Pretoria

Viscusi, G., Batini, C. & Mecelle, M. 2010. Information systems for eGovernment: a quality-of-service perspective. Berlin: Springer.

Wager, K.A., Lee, F.R. & Glaser, J.P. 2009. Health care information systems: a practical approach for health care management. 2nd ed. San Francisco, Calif.: Jossey-Bass.

Waltz, C.F., Strickland, O.L. & Lenz, E.R. 2010. Measurement in nursing and health research. 4th ed. New York: Springer

Wikipedia, the free Encyclopedia. 2006. Waterberg district. [http://en.wikipedia.org/wiki/File:South\\_Africa\\_Districts\\_showing\\_Waterberg.png](http://en.wikipedia.org/wiki/File:South_Africa_Districts_showing_Waterberg.png) Date of access: 21 April 2014. World Health Organisation. 2003. Improving data quality: a guide for developing countries. Geneva: World Health Organisation.

Wolvaardt, G., Johnson, S., Cameron, D., Bothai, B. & Kornikii, S. 2014. Challenges and constraints at district management level. South African Health Review. Durban: Health Systems Trust.

World Health Organisation. 2003. Improving Data Quality: A Guide For Developing Countries. From [http://www.phinnetwork.org/portals/0/improving\\_data\\_quality.pdf](http://www.phinnetwork.org/portals/0/improving_data_quality.pdf)

World Health Organization webpage. 2014. From <http://www.who.int/topics/ehealth/en/>

**ANNEXURES:****ANNEXURE 1: REQUEST PERMISSION FROM LIMPOPO HOD FOR HEALTH**

The Head of Department

11 February 2014

Limpopo Department of Health

Private Bag 9302

Polokwane

0700

Sir

**REQUEST FOR PERMISSION TO CONDUCT A STUDY IN WATERBERG DISTRICT, LIMPOPO**

I am a postgraduate student enrolled for a Master of Public Health (MPH) degree with specialisation in Medical Informatics (Information Systems) with the University of South Africa (UNISA). May I please request permission to conduct a study, as partial fulfilment towards my degree, in Limpopo

The topic of my dissertation of a limited scope is as follows: "The District Health Information System (DHIS) As a Support Mechanism for Data Quality Improvement in Waterberg District, Limpopo: An Exploration of Staff Experiences"

The purpose of the study is to explore the experiences of district information officers (DIOs) with the aim of developing ways of producing quality data for fruitful evidence-based decisions. This study will assist health information staff, health programme managers, clinicians, sponsors to optimise the quality routine information, strengthen best practices, identify and rectify areas that need improvement. The results of the study may be used as a guideline in developing and/or implementing existing action plans for data challenges or other health information concerns.

The method of the study will be qualitative; data will be collected through interviews with the staff. The findings of the study will be shared with your district office and province

I am an optometrist by profession registered with the Health Professions Council of South Africa (HPCSA) with about five years of public health experience in total, both in hospital in Limpopo (clinical) and national in Pretoria (non-clinical), Departments of Health

I believe and hope the output of this health information systems study will be of value to Limpopo Province (even to the rest of South Africa)

**Attachments:**

1. UNISA Health Studies Research and Ethics Committee clearance certificate
2. Research Proposal

I hope that you will be able to accommodate my request and will appreciate a favourable written feedback at your earliest convenience

Regards



.....  
Idon Nkhenso Sibuyi

UNISA Student No: 46655042

PO BOX 8591, Centurion, 0046

Mobile no: 083 338 9132; Fax-to-Mail: 086 776 4235

E-mail: insibuyioptometrist@gmail.com

## ANNEXURE 2: REQUEST FOR ACCESS FROM WATERBERG DEM FOR HEALTH

To: The District Executive Director

02 April 2014

Cc: Manager PHC Services

Waterberg Health District

Private Bag x1026

Modimolle

0510

Madam

### REQUEST FOR ACCESS TO CONDUCT A STUDY IN WATERBERG DISTRICT OFFICE AND PHC FACILITIES

I am a postgraduate student enrolled for a Master of Public Health (MPH) degree with specialisation in Medical Informatics (Information Systems) with the University of South Africa (UNISA).

The Head of Department of Health in Limpopo has granted, through the Research Ethics Committee, a permission to conduct a study in your district. I therefore humbly request your permission to access the facilities and district office to conduct the study. Upon you granting access, the staff concerned will need to be informed, I will appreciate your assistance in that regard.

The topic of my dissertation of a limited scope is as follows: "The District Health Information System (DHIS) As a Support Mechanism for Data Quality Improvement in Waterberg District, Limpopo: An Exploration of Staff Experiences"

The purpose of the study is to explore the staff experiences of in using the DHIS with the aim of developing ways of producing quality data for fruitful evidence-based decisions. This study will assist facility managers, health information staff, health programme managers, clinicians, partners to optimise the quality routine information, strengthen best practices, identify and rectify areas that need improvement. The results of the study may be used as a guideline in developing and/or implementing existing action plans for data challenges or other health information concerns.

The method of the study will be qualitative; data will be collected through interviews with the health information officers (district office and facility based), PHC facility managers, clinicians, health program managers. The findings of the study will be shared with your district office and province.

I am an optometrist by profession registered with the Health Professions Council of South Africa (HPCSA) with about five years of public health experience in total, both in hospital in Limpopo (clinical) and national in Pretoria (non-clinical), Departments of Health

I believe and hope the output of this health information systems study will be of value to Waterberg Health District (even to the rest of Limpopo and/or South Africa)

Attachments: 1. UNISA Health Studies Research and Ethics Committee Clearance and 3. Approval Letter from Limpopo HOD: Health 3. Research Proposal

I hope that you will be able to accommodate my request and will appreciate a favourable written feedback at your earliest convenience

Regards



.....  
Mr Sibuyi I.N. (Idon Nkhenso)

UNISA Student No: 46655042

PO BOX 8591, Centurion, 0046

Mobile no: 083 338 9132; Fax-to-Mail: 086 776 4235

E-mail: insibuyioptometrist@gmail.com







**ANNEXURE 5: PERMISSION TO ACCESS WATERBERG PHC FACILITIES**

**LIMPOPO**  
PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

---

**DEPARTMENT OF HEALTH**  
**WATERBERG DISTRICT**

---

**REF: 8/1/1.**  
**ENQ: BOSCH N.C. (ACTING SENIOR MANAGER: PHC)**  
**DATE: 13/05/2014**

**SIBUYI I.N.**  
**UNIVERSITY OF SOUTH AFRICA**  
**P.O. BOX 392**  
**UNISA**  
**0003**

**RE: THE DISTRICT HEALTH INFORMATION SYSTEM (DHIS) AS A  
SUPPORT MECHANISM FOR DATA QUALITY IMPROVEMENT IN  
WATERBERG DISTRICT, LIMPOPO, AN EXPLORATION OF STAFF  
EXPERIENCE.**

The above bear's reference:-

1. This office has noted that the permission to conduct a study in terms of the above has been granted by the Head of Department.
2. Kindly note the following:-
  - ❖ Please forward to us the names of the facilities you intend to visit, and the time frame or the dates in which you intend to start with your study in order for us as the district to liaise and inform the facilities identified.
  - ❖ Upon completion of your study a copy should be submitted to the district office for attention of the District Executive Manager which will serve as a proof of the study conducted.
3. Further note that we agree to the permission granted and are prepared to assist to make sure that the study succeed.

Your support and cooperation in terms of the above will be highly appreciated.

*Bosch*  
=====

**ACTING SENIOR MANAGER: PHC.**  
**WATERBERG DISTRICT**

*13/5/2014*  
=====

**DATE**

---

**ANNEXURE 6: PERMISSION TO USE DATA COLLECTION TOOLS**

To: Sibuyi IN

30 April 2014

Cc: Prof BL Dolamo

School of Health Studies

University of South Africa

PO Box 392

UNISA, 0003


Dear Mr Sibuyi

**RE: Request to use 3 Data Collection Tools for this study: "The District Health Information System (DHIS) As a Support Mechanism for Data Quality Improvement in Waterberg District, Limpopo: An Exploration of Staff Experiences"**

The above matter refers:

- As the owner of the 3 data collection tools, I hereby grant permission to use the data collection tools
- The data collection tools codes are as follows: APPENDIX 1, APPENDIX 2 & APPENDIX 3, As coded in this study report: "A Rapid Evaluation of Routine Primary Health Care Data Management Systems And Flow Within The District Health System In The Western Cape Province, South Africa by RG English, University of Cape Town, South Africa
- The source of the data collection tools should be acknowledged as far possible in your report
- I am prepared to clarify, should there be a need, the concepts on the data collection tool to the researcher/student before data collection process begin

Regards



.....

Dr René G English; MBChB(UCT), MMed(UCT), FCPHM(SA), PhD(UCT)

Director; Health Systems Research Unit

Health Systems Trust (HST)

## ANNEXURE 7: PARTICIPANT INFORMATION SHEET & CONSENT FORM

### PARTICIPANT INFORMATION SHEET

#### Part I: INFORMATION DOCUMENT

**Title of the Study: THE DISTRICT HEALTH INFORMATION SYSTEM (DHIS) AS A SUPPORT MECHANISM FOR DATA QUALITY IMPROVEMENT IN WATERBERG DISTRICT, LIMPOPO: AN EXPLORATION OF STAFF EXPERIENCES**

I, Idon Nkhenso Sibuyi, a postgraduate student doing Master of Public Health degree with specialisation in Medical Informatics with the University of South Africa (UNISA), am doing a research in the district information officers' (DIO) experiences in using the DHIS as a supporting mechanism for data quality improvement. In this study we want to learn, explore and interpret your experiences in terms of data quality in all activities that involve data, including but not limited to, the data collection process, District Health Information System, the information flow cycle, reporting etc

#### **Participant Selection**

You will be selected because of your job description or designation in your workplace and then presented with this research information

#### **Invitation to participate:**

We are asking you to participate in this research study

#### **The study involves the following:**

After you have read or being read to the following information and agree to take part in the study, you will be interviewed by the researcher in your work environment at the time and place convenient to you. A structured interview process will be followed; your responses will be recorded mainly in writing and/or electronically. The interview process will take about 20 to 30 minutes. There will be no need to access your DHIS Information or any stored information or observation on how you work with data.

#### **Risks:**

There is no risk in participating in this study. We will only conduct an interview in order to understand your experience in relation to the data quality in the DHIS

#### **Benefits:**

This study will assist facility managers, health information staff, health programme managers, clinicians, sponsors to optimise the quality routine information, strengthen best practices, identify and rectify areas that need improvement. The results of the study may be used as a guideline in developing and/or implementing existing action plans for data challenges or other health information concerns

#### **Alternative Procedures:**

The interview may be conducted telephonically, for exceptional cases. However, consent form will have to be faxed before the interview process commence

**Information/Findings on the study**

The participant will be given pertinent information on the study while involved in the study and after the results are available. The findings will be shared with the district and/or province

**Voluntary Participation:**

Your participation in this study is entirely voluntary. You may agree or refuse participation in this study; the choice you make will have no bearing on your job or any work-related evaluations or reports. You may even withdraw from the study at any stage, even if you agreed earlier.

**Reimbursements:**

No expenses are due to you for participating in this study. No reimbursement will be made to participants during and/or after the study.

**Confidentiality:**

No personal information will be shared about the participant in this study; all information will be treated or recorded anonymously. Personal information may be disclosed only if required by law

**Contact details for further information/reporting of study related adverse events:**

Researcher: Mr Idon Sibuyi at mobile phone 0833389132 or email: [insibuyioptometrist@gmail.com](mailto:insibuyioptometrist@gmail.com)

or

Supervisor: Prof Bethabile Dolamo at telephone 0124296213 or email: [dolambl@unisa.ac.za](mailto:dolambl@unisa.ac.za)

or

MPH Programme Coordinator: Prof Sarie Human at telephone 0124296290 or [humansp@unisa.ac.za](mailto:humansp@unisa.ac.za)

**Part II: INFORMED CONSENT**

I have read the foregoing information; or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked I have answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of Participant:.....

District.....

Designation.....

Signature of Participant.....

Signature of Witness (If interview to be done telephonically).....

Date:.....

**ANNEXURE 8: DATA COLLECTION TOOL ONE****TOOL 1: Facility**

Sub-District Code	
Facility Code	
Participant Code	
Participant Designation Code	
Date	

**Biographic Data:**

Age	18 - 24	1		No of years employed	1 - 5	1	
	25 - 30	2			6 - 10	2	
	31 - 40	3			11 - 15	3	
	41 - 60	4			15 & above	4	
Level of Education	Matric	1		Gender	Male	1	
	Diploma	2			Female	2	
	Degree	3			Other	3	
	Masters / PhD	4					

**Questions:**

**1. What are the biggest challenges facing the facility with regards to Information Management?**

---



---



---



---



---



---

**2. What are the strengths relating to Information Management at this facility?**

---



---



---



---



---



---

**3. What is the one aspect of Information Management, that should it be changed or improved on, will make a significant difference to how information is managed in this facility?**

---

---

---

---

---

---

---

---

**4. What kind of intervention(s) would you propose to improve Information Management at any level in this facility?**

---

---

---

---

---

---

---

---

**5. Do you have any other relevant comments?**

---

---

---

---

---

---

---

---

**6. What kind of technical assistance is needed in this facility?**

---

---

---

---

---

---

---

---

**THANK YOU**



**ANNEXURE 9: DATA COLLECTION TOOL TWO**

**TOOL 2: District + Sub-District**

Sub-District Code	
Participant Code	
Participant Designation Code	
Date	

Biographic Data:

Age	18 - 24	1		No of years employed	1 - 5	1	
	25 - 30	2			6 - 10	2	
	31 - 40	3			11 -15	3	
	41 - 60	4			15 & above	4	
Level of Education	Matric	1		Gender	Male	1	
	Diploma	2			Female	2	
	Degree	3			Other	3	
	Masters / PhD	4					

Questions:

1. What are the biggest challenges facing the Information Management Unit?

---



---



---



---



---



---



---

2. What are the strengths of the Information Management Unit?

---



---



---



---



---



---



---

3. What is the one aspect of Data / Information Management, that should it be changed or improved on, will make a significant difference to how information is managed in this district / sub-district

---

---

---

---

---

---

---

**4. What kind of intervention(s) would you propose to improve Information Management at any level within this district / sub-district?**

---

---

---

---

---

---

---

---

**5. What other comments would you add?**

---

---

---

---

---

---

---

---

---

---

**6. What kind of technical assistance is needed within the district / sub-district?**

---

---

---

---

---

---

---

---

---

---

**THANK YOU**

## ANNEXURE 10: DATA COLLECTION TOOL THREE

### TOOL 3: Health Programme Management

#### Demographic Information:

Sub-District Code	
Participant Code	
Date	

#### Biographic Data:

Age	18 - 24	1		No of years employed	1 - 5	1	
	25 - 30	2			6 - 10	2	
	31 - 40	3			11 -15	3	
	41 - 60	4			15 & above	4	
Level of Education	Matric	1		Gender	Male	1	
	Diploma	2			Female	2	
	Degree	3			Other	3	
	Masters / PhD	4					

#### Questions for the semi-structured interviews:

1. What are your perspectives on health information management in the District and in your Sub-district?

---



---



---



---



---



---



---



---

2. What the primary challenges that you face with regards to data management, flow and quality?

---



---



---



---



---



---

---

---

**3. What are the strengths and weaknesses?**

---

---

---

---

---

---

---

---

---

---

**4. Describe the data management practices in your sub-district**

---

---

---

---

---

---

---

---

---

---

**5. What can be done to improve data management and quality?**

---

---

---

---

---

---

---

---

---

---

**THANK YOU**

***'It is not because countries are poor that they cannot afford good health information; it is because they are poor that they cannot afford to be without it.'***

***-AbouZahr and Boerma (2005:5)***