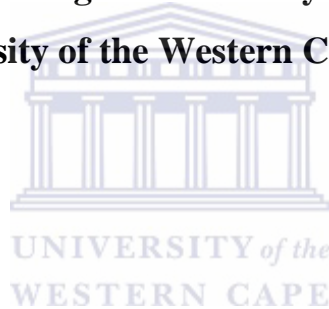


**Developing a framework for a District-Based Information Management
System for Mental Health Care in the Western Cape**

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**A thesis submitted in fulfilment of the requirements for the degree
Philosophiae Doctor in Nursing in the Faculty of Community and Health
Sciences, University of the Western Cape, South Africa**



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November 2013

ABSTRACT

A review of the literature has shown that there is a lack of mental health information on which to base planning of mental health services and decisions concerning programme development for mental health services. Several studies have indicated that the use of an evidence-based health information system (HIS) reduces inappropriate clinical practices and promotes the quality of health care services. This study was aimed at developing a framework for a district-based mental health information management system, utilising the experiences of health care providers and caregivers about a district mental health information system (DMHIS).

Activity Theory was used as the philosophical foundation of the information system for the study. A qualitative approach was employed using semi-structured individual interviews, Focus Group Discussions (FGDs), systematic review and document analysis. The intervention research design and development model of Rothman and Thomas (1994) was used to guide the study, which was conducted in the Cape Town Metropole area of the Western Cape. A purposive, convenient sampling method was employed to select study participants. Ethical clearance for the study was obtained from the University of the Western Cape, and permission to use the health facilities from the Department of Health.

The data collection process involved 62 individual interview participants, from mental health nurses to district health managers, health information clerks, and patient caregivers/families and persons with stable mental conditions. Thirteen caregivers took part in the FGDs. Document review was conducted at three community mental health centres. The data were analysed manually using content analysis. Core findings of the interviews were lack of standardized information collection tools and contents for mental health, information infrastructure, capacity building, and resources. Information processing in terms of collection, compiling, analysing, feedback, access and sharing information were the major problems.

Results from document analysis identified inconsistencies and inaccuracies of information recording and processing, which in turn affected the quality of information for decision making. Results from the systematic review identified five functional elements: organizational structure; information infrastructure; capacity building; inputs, process, output and feedback; and community and stakeholders' participation in the design and implementation of a mental health information system (MHIS).

The study has contributed a framework for a DMHIS based on the findings of the empirical and systematic review. It is recommended that there is a need to establish a HIS committee at district health facility level for effective implementation of the framework and quality information processing. There is a need to ensure that staffs have adequate knowledge and skills required for effective implementation of an information system. It is recommended that higher education institutions include a course on HISs in their curriculum. It is suggested that the South African Mental Health Policy be reviewed to include an MHIS and ensure involvement of the community and stakeholders in this system as well as adequate budget allocation.

Keywords:

District health system

District mental health information system

Information audit

Information pathway

Information process

Functional elements

Mental health information needs

Design and development model

Mental healthcare providers

Caregivers

Document analysis



DECLARATION

I declare that “*Developing a framework for a District-Based Information Management System for Mental Health Care in the Western Cape*” is my own work, that it has not been submitted before for any degree or examination in any other University, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Million Bimerew

Date: November, 2013



A handwritten signature in black ink, appearing to read "Million Bimerew".

Signed

DEDICATION

I dedicate this PhD dissertation to my father who passed away a month before my graduation and to my wife Rahel Tegene and our children Yeabneh Million Bimerew and Amy Million Bimerew.



Acknowledgements

First of all, I would like to thank my Almighty God for his love and giving me the courage, strength and wisdom to start and complete this academic journey. Thank you Lord!

This academic journey would have been impossible without the support of many people; therefore, I am indebted to the following. My special gratitude and appreciation go to my research supervisor, Prof. Oluyinka Adejumo, for taking the responsibility of the supervision role on my PhD study, and for his excellent guidance and support, for being available for consultation at all times, for keeping me on track, and for funding support to present the results of my study at an international conference. It would have been impossible without his support and encouragement. Thank you for making it possible.

I would like to express my heartfelt gratitude and appreciation to my co-supervisor, Prof. Mikko Korpela from the University of Eastern Finland and Adjunct Professor at Cape Peninsula University of Technology, for accepting my application for him to be my co-supervisor without any precondition, and for his excellent guidance and unlimited mentorship and support throughout the research process. You have inspired me and made me believe in my research.

My special thanks go to Prof. Susan Terblanche for her significant inputs and contribution during the proposal development and early stage of this research study, for putting my thoughts in order when they were not, and for being a critical reader. My special thanks also go to Dr L. Aziato from the University of Ghana for her intellectual inputs and contribution to the draft of my PhD. Her valuable comments helped me to relook at gaps in my work and where attention was needed. Her constant encouragement and support enabled me to work hard and focus. I thank Dr Patricia J. Kelly from the University of Missouri, USA, for her

inputs on the draft of this dissertation. I am grateful to my friends Anita Dartey and Unathi Mayinje for being a source of information, constant moral support and advice.

My colleagues at the School of Nursing at the University of the Western Cape are thanked for their constructive advice, suggestions and support during the study. I would also like to thank my study participants for taking part in the study. My thanks also go to the Western Cape Province Department of Health and facility managers for allowing me to use the health facilities for research purposes.

My special thanks go to the panel members and expert participants who reviewed and validated the draft of the framework, and provided me with constructive feedback and suggestions.

Finally, my words of thanks go to my family for their support and encouragement. My dearest thanks go to my beloved wife Rahel Tegene for her love, tireless support, encouragement, patience, transcribing the interviews and cross-checking my reference list. Special thanks go to our children Yeabneh Bimerew and Amy Bimerew for their patience and understanding while I was busy with my study and unable to be with them when they needed me most. I love you so much, and God bless you.

Table of contents

Abstract.....	ii
Keywords.....	iii
Acknowledgement.....	vi
List of abbreviations.....	xvi
Operational definitions of key concepts.....	xvii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background	1
1.2 Mental health conditions in South Africa.....	3
1.3 Problem statement.....	7
1.4 Aim of the study.....	8
1.5 Research questions.....	9
1.6 Objectives of the study.....	9
1.7 Significance of the study.....	10
1.8 Outline of the thesis	10
1.9 Conclusion.....	11
CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL BACKGROUND.....	12
2.1 Introduction.....	12
2.2 HIS: Concepts and influence of IT on health care.....	12
2.2.1 An overview of MHIS.....	15
2.2.2 DHIS.....	20
2.2.3 Different stages of mental health information collection and processing	22
2.2.4 MHIS indicators.....	23
2.2.5 DHIS information flow.....	25
2.2.6 Mental health information management and information sharing.....	26
2.2.7 DHIS software (DHISS).....	28
2.2.8 Information audit system.....	30
2.3 Mental health policy guidelines in the context of information systems.....	30
2.3.1 Mental health information gathering for decision making process.....	32

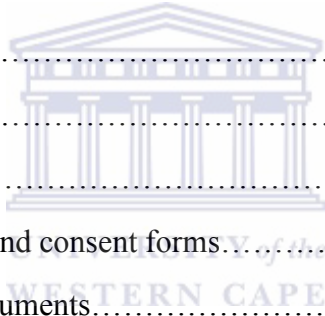
2.3.2 Mental health policy conditions in African countries.....	33
2.3.3 MHIS and policy development in South Africa.....	36
2.4 Information management system and activity theory.....	42
2.4.1 An overview of information management systems.....	42
2.4.2 Activity theory.....	44
2.4.3 Activity theory as a theoretical framework of the study.....	48
2.5 Conclusion.....	54
CHAPTER THREE: RESEARCH METHODOLOGY.....	55
3.1 Introduction.....	55
3.2 Choice and assumption of the research approach.....	55
3.3 A summarized introduction to intervention research design and development.....	59
3.4 Phase one of intervention research design and development: problem analysis and project planning.....	65
3.4.1 Research setting.....	66
3.4.2 Gaining entry/access to settings.....	67
3.4.3 Identifying the study population.....	68
3.4.4 Sampling the study population.....	69
3.4.5 Developing an interview guide.....	72
3.4.6 Developing an instrument for document review.....	73
3.4.7 Pilot testing.....	73
3.4.8 Data collection process.....	74
3.4.9 Data collection methods.....	75
3.4.9.1 Semi-structured interviews.....	75
3.4.9.2 FGDs.....	83
3.4.9.3 Document review.....	87
3.4.10 Data analysis.....	89
3.5 Phase two: Information collection for design and development: A systematic review of a DMHIS.....	93
3.5.1 Aim of systematic review.....	93
3.5.2 Objectives of systematic review.....	93

3.5.3 Systematic review question.....	93
3.5.4 Types of studies.....	94
3.5.5 Types of participants.....	94
3.5.6 Selection criteria.....	95
3.5.7 Search method for identifying studies.....	95
3.5.8 Data extraction and analysis.....	97
3.6 Research Rigor.....	98
3.6.1 Establishing trustworthiness.....	98
3.6.1.1 Credibility.....	98
3.6.1.2 Transferability.....	99
3.6.1.3 Dependability.....	99
3.6.1.4 Conformability.....	100
3.6.1.5 Triangulation.....	100
3.6.1.6 Member checking.....	101
3.7 Ethical considerations.....	103
3.8 Phase three: Design & development of the framework.....	105
3.9 Phase four: Expert participants review of the framework.....	107
3.10 Conclusion.....	109
CHAPTER FOUR: PRESENTATION OF THE FINDINGS OF THE STUDY.....	111
4.1 Introduction.....	111
4.2 Phase one: experience of mental health nurses, facility managers and information clerks, in theDMHIS.....	111
4.2.1 Standards of mental health information collection tools and types of content.....	112
4.2.1.1 Lack of standard information tools.....	113
4.2.1.2 Types of information content.....	118
4.2.2 Information processing.....	124
4.2.2.1 Quality of information processing.....	125
4.2.2.2 Validation of information.....	128

4.2.2.3 Feedback in information processing.....	132
4.2.3 Inadequate information competency.....	136
4.3 Mental health information flow in the district health care services.....	141
4.3.1 Manual and electronic information processing infrastructure and networking.....	141
4.3.1.1 Manual information processing and networking.....	142
4.3.1.2 Electronic information processing and networking.....	147
4.3.1.3 System for information analysis and utilization.....	153
4.4 Factors affecting a DMHIS.....	155
4.4.1 Poor organizational support.....	156
4.4.2 Mental health receive low priority and operates in isolation.....	157
4.4.3 Staff understanding of the importance and use of health information	160
4.5 Findings from the FGDs.....	163
4.5.1 Lack of support and inadequate health information sharing.....	163
4.6 Findings from individual interviews with caregivers and stable persons with mental Conditions.....	167
4.6.1 Client waiting time and quality of services.....	167
4.6.2 Mental health education and information at health facility.....	170
4.7 Findings from document review.....	171
4.7.1 Lack of standard data collection tools.....	172
4.7.2 Inaccuracies and inconsistencies in information recording and processing.....	173
4.7.3 Information validation, reporting and feedback.....	174
4.8 Summary of key findings.....	176
4.8.1 Lack of information collection tools and contents.....	177
4.8.2 Information infrastructure requirements.....	177
4.8.3 Poor information processing, output and outcome.....	178
4.8.4 Lack of competency in information processing.....	179
4.8.5 Limited availability of resources (technical, human and financial).....	180
4.9 Phase two: Findings from the systematic review.....	182
4.9.1 Studies forming the context of DMHIS framework development.....	186

4.9.1.1 Critical appraisal criteria for qualitative research papers.....	187
4.9.1.2 Critical appraisal of qualitative research papers.....	188
4.9.1.3. Data extraction from qualitative research papers.....	190
4.9.1.4 Concepts identification.....	197
4.9.1.5 Critical appraisal criteria for text and expert opinion paper.....	198
4.9.1.6 Critical appraisal of text and opinion papers.....	200
4.9.1.7 Data extraction from text and expert opinion papers.....	202
4.9.1.8 Concept identification.....	209
4.9.1.9 Concept building and synthesis.....	209
4.9.2 Higher-level concepts.....	211
4.9.2.1 Community and stakeholders’ participation.....	211
4.9.2.2 Information infrastructure.....	213
4.9.2.3 Information inputs, process, outputs and feedback.....	214
4.9.2.4 Organizational supporting environment.....	217
4.9.2.5 Capacity building in HIS.....	219
4.9.3 Information matrix using phase one and phase two results.....	220
4.9.4 Conclusions.....	226
4.10 Phase three: Design and development of the framework for a DMHIS.....	229
4.10.1 Design and development of a framework.....	229
4.10.2 Proceduralization process of the framework.....	233
4.10.3 The prescriptive statements of the framework.....	235
4.10.4 Potential benefits of implementation of the framework.....	242
4.11 Phase four: Experts’ validation of the framework.....	243
CHAPTER FIVE: SUMMARY OF FINDINGS AND DISCUSSION.....	245
5.1 Introduction.....	245
5.2 Summary of the findings informing the development of the framework.....	245
5.3 Response to the research questions.....	248
5.3.1 Information collection tools and content.....	248
5.3.2 Information processing.....	251

5.3.3 Information competency.....	256
5.3.4 Information infrastructure.....	257
5.3.5 Resources (human, technical and financial).....	260
5.4 Contribution of the study.....	263
5.4.1 Theoretical contribution.....	263
5.4.2 Practical contribution.....	264
5.4.3 Methodological contribution.....	265
5.4.4 Implications for further research.....	266
5.5 Limitations of the study.....	267
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS.....	270
6.1 Introduction.....	270
6.2 Conclusions.....	271
6.3 Recommendations.....	275
REFERENCES.....	278
Appendices.....	309
Appendix 1. Information sheets and consent forms.....	309
Appendix 2. Data collection instruments.....	313
Appendix 3. Background of the expert reviewers.....	317
Appendix 4. Ethical clearance letter.....	318
Appendix 5. Consensus forum reg. form.....	319
Appendix 6. Consensus agreement form.....	320



List of tables

Table 2.1: Leontiev’s (1978) three-level model activity analysis.....	49
Table 3.1: Phases of intervention research design and development (Rothman & Thomas,1994)	62
Table 3.2: Interview participants	70
Table 3.3: List of expert reviewers.....	107
Table 4.1: Experiences of mental health nurses, facility managers and information clerks in the DMHIS.....	112
Table 4.2: Summary of the key findings.....	181
Table 4.3: Criteria for critical appraisal of qualitative research findings.....	187
Table 4.4: Critical appraisal of qualitative research findings.....	188
Table 4.5: Data extraction from qualitative research papers.....	191
Table 4.6: Findings from qualitative systematic review papers	197
Table 4.7: Criteria for critical appraisal of textand opinion papers.....	199
Table 4.8: Critical appraisals of the text and opinion papers	200
Table 4.9: Data extraction from text and expert opinion papers	206
Table 4.10: Findings from systematic review of text and opinion papers.....	209
Table 4.11: Links and concept development from the findings of the qualitative systematic review and text/expert opinion papers.....	210
Table 4.12: Links and higher-level concept development from key findings of the empirical and systematic review.....	211
Table 4.13: Matrix table showing the functional elements developed from systematic review to address the problems identified from the empirical study.....	222

Table 4.14: Mapping the current DMHIS in the Cape Town Metropole region in the Western Cape.....	228
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List of Figures

Figure 2.1: Engestrom’s model of collective human activity	47
Figure 2.2: Application of activity theory as the theoretical foundation of the study (adopted from Engestrom, 1987.....)	51
Figure 3.1: Intervention research design and development model of Rothman and Thomas (1994) as applied to the study.....	64
Figure 3.2: Map of the geographical spread of the research sites.....	67
Figure 4.1: Relationship of identified key areas to the DMHIS.....	176
Figure 4.2: Screening process to select studies.....	184
Figure 4.3: Framework for DMHIS.....	232

List of boxes

Box 1: Organizational support structure.....	236
Box 2: Information infrastructure and networking for DMHIS.....	237
Box 3: Capacity building programme in information system.....	238
Box 4: Community and stakeholders’ participation in design and implementation of information collection tools and content.....	240
Box 5: Develop the culture of quality information processing and utilization at health facility level.....	240

List of abbreviations

CHC	Community health centre
DHIS	District Health Information System
DHISS	District Health Information System software
DHMIS	District-based mental health information system
DoH	Department of Health
eHealth	Electronic health
FGD	Focus group discussion
HIS	Health information system
HIMS	Health information management system
HMN	Health Metrics Network
ICD10	International Classification of Diseases 10 th edition
ICT	Information and Communication Technology
IT	Information Technology
MDGs	Millennium Development Goals
MHIS	Mental health information system
MHMDS	Mental health minimum data set
PHC	Primary health care
PRISM	Performance of Routine Information System Management
RHINO	Routine Health Information Network
WHO	World Health Organization

Operational definitions of key concepts

Caregivers are defined as family members/relatives or home-based caregivers that provide mental health care for the mentally ill person in the district.

District-based mental health information system is a system for collecting, processing, disseminating and utilization of district-based mental health information for the need of the population it serves.

District health system includes all secondary hospitals and community health centres in a district, but for the purposes of this study it is defined as those secondary hospitals and community health centres that provide mental health services.

Document analysis is defined as the review of either paper-based or computer-based records of information on mentally ill patients

Functional elements are defined as the existing successful models of information management system elsewhere which can be taken as examples to extract from the functional elements.

Information pathway is the network and transfer of district-based mental health information between health facilities, the Provincial Department of Health, City of Cape Town, and National Department of Health.

Information process is the collection, recording, storing, analysis and utilization of district-based mental health information.

Mental health experts are consultant psychiatrists for community mental health services at district level, psychiatric researchers, and mental health policy makers. **Mental health care providers** are those involved in direct or indirect provision of mental health services; they include mental health nurses, caregivers, the district health manager, district information officers and psychiatric experts.

Mental health information needs is defined as the collection and processing of district mental health information for specific purposes.

CHAPTER ONE

INTRODUCTION

1.1 Background

Mental health conditions have become recognized as being among the leading causes of mortality and disability across the world (World Health Organization (WHO), 2001). It has been reported that among people aged 15-44 years, the most productive segment of any population, mental disorders account for 6 of the 20 leading causes of disability worldwide (WHO, 2001). It is estimated that 1 in 4 people globally experience a mental health condition in their lifetime (WHO, 2011). In addition, more than 150 million people worldwide suffer from depression and 1 million people are said to die every year due to suicide-related causes (WHO, 2011). Mental health conditions are also known to be the third leading cause of death among young people; also, 125 million people across the world are affected by alcohol use disorders, and alcohol is said to cause 3.2% of all deaths globally or 1.8 million deaths annually. Furthermore, more than 40 million people suffer from epilepsy, and 24 million suffer from Alzheimer's disease (WHO, 2011).

Mental, neurological and substance use disorder accounts for 14% of the global burden of disease worldwide (WHO, 2005). The consequences of mental health problems are enormous in terms of disability, human suffering and economic loss. Mental health conditions account for 8.8% and 16.6% of the total burden of disease due to health conditions in low- and middle-income countries respectively (United Nations (UN)/WHO, 2010).

UN/WHO (2010) reported that a reasonable investment in treatment of mental health conditions can contribute to improved mental health for people and a country's development, since the majority of people with mental illness in low- and middle-income countries do not

have access to essential income generation, education, human rights, health and other social services. Such people have usually been excluded from the development agenda and marginalized in many countries throughout the world. The resources directed to manage this huge mental health problem are in most cases very low (for example, less than 1% of the total health budget of a country), inequitably distributed and mismanaged. Furthermore, 30% of countries globally do not have a specified budget for mental health (WHO, 2010). Among those that have such a budget, less than 1% of their total health budget is spent on mental health.

The under-allocation of resources for mental health conditions is not only due to lack of resources but rather is a reflection of multifaceted factors, such as failure to understand issues related to mental illnesses and misconceptions about the nature of mental illness among many communities, political leaders and policy makers, especially in low-income countries (WHO, 2005, 2010). Consequently, more than 47% of the low-income countries lack a complete mental health policy and 22% do not have a specific legislation that deals with mental health cases. In cases where such legislation does exist, the policies or legislation are either outdated or inappropriate (WHO, 2005, 2010). It follows then that a country where the mental health care budget is less than 1% of the total health budget, with no mental health legislation and mental health policy, the type of mental health services provided to the needy will be inequitable, below standard, and may as well hinge on human rights violations of individual citizens.

In addition, the cost of mental health treatment and the impact on the economic productivity of people with mental disorders and those who care for them (close family members) are devastating (WHO, 2005). It was reported that more than three-quarters of people with mental disorders don't receive treatment (UN/WHO, 2010; WHO, 2009). The World Health Organization Assessment Instrument for Mental Health Systems (WHO-AIMS) indicators

suggested that the mental health system in low- and middle-income countries is providing mental health care for a very small proportion of all of those who need it (WHO, 2009). The average treatment rate for people with mental illnesses accounts for 0.67% of the general medical treatment which means that very few people with mental problems receive treatment. The treatment rate for children is even lower at 0.16%, and it was estimated that 1 in 20 children has severe mental illness (WHO, 2009).

1.2 Mental health conditions in South Africa

From 2002 to 2004, an epidemiological study was conducted to determine the 12-month prevalence of mental disorders in South Africa; it was found that there was 16.5% prevalence, with 26.2% of the respondents being severe cases and 31.1% moderately severe cases (Williams *et al.*, 2007). A study to determine the common mental health problems and substance disorders in rural Limpopo province and Khayelitsha township in Cape indicated that more than one-third (34.9%) of the community sampled reported a high level of anxiety or depression symptoms (Havenaar, Geerlings, Vivan, Collinson & Robertson, 2008). Among the respondents from primary health care (PHC) clinics and traditional healers, the prevalence rates of mental health problems and substance abuse disorders were found to be as high as 72.5% and 82.9% respectively (Havenaar, et al, 2008). In the same study, it was reported that out of 99 women, 44% were depressed, and of 71 men, one-fourth (17.8%) of them were depressed.

Furthermore, the growing prevalence of HIV/AIDS was cited to be associated with an elevated risk of mental health problems in infected individuals and their families (Havenaar, Geerlings, Vivan, Collinson & Robertson, 2008). Moreover, mental health problems are said to be compounded by poverty, HIV/AIDS, stigma, the status of women and children, lack of knowledge of mental health, and lack of access to appropriate treatment and social and

mental health services (Honikman *et al.*, 2004). Evidence has shown that knowledge about mental health in South Africa is sub-optimal; for example, many lay people, including family members and patients alike, lack an understanding of mental health illness; worse still, the community health care personnel who are supposed to help the patients hold negative attitudes towards people with mental illness (Hugo, Boshoff, Traut, Zungu-Dirwayi & Stein, 2003; Mbanga, Niehaus & Mzamo, 2002, Dirwayi, 2002; Emsley, 2001).

Despite the high prevalence rates of mental health disorders, their economic impact on the affected individuals, their families and communities and associated stigmatization, mental health services are given low priority in policy agenda and forgotten in the Millennium Development Goals due to lack of information, low prioritization by donors and low political priority (Omar *et al.*, 2010; WHO, 2004). Furthermore, it has been documented that a lack of sufficient and accurate information upon which policy formulation is to be based has always been challenging in low- and middle-income countries.

In attempting to address these challenges in 1995 South Africa established a Mental Health Information Centre (MHIC) with the aim of educating both health professionals and the public on mental health disorders and addressing the stigma. The MHIC programme focuses on awareness and education activities for better understanding of mental illness, diagnosis and appropriate treatment, and current and accurate information to enable informed decision making and to address stigma associated with mental illness (Hugo, Roover, Soraya & Stein, 2004). However, no report was found as to whether the MHIC programme has been evaluated in achieving its aim and objectives.

In another development process, South Africa initiated a District Health Information System (DHIS) roll-out strategy in the latter half of 1999; however, the DHIS did not cover adequate mental health information and there is increasing concern about the unavailability of adequate

mental health information. The lack of data was a general problem, attributed to the lack of mental health indicators in the health management information system (Omar *et al.*, 2010). For example, a WHO report (2007) indicated that information systems for monitoring community-based mental health care and staff are very weak in South Africa. Additionally, no records were kept on the diagnosis of users treated in community-based psychiatric inpatient units. Likewise, the average length of admission, number of children and adolescents and gender distribution are not routinely recorded. Thus, data are not available from the community mental health facilities. The report further indicated that neither the South African Federation for Mental Health nor the Department of Health (DoH) could provide information on the number of children and adolescents and their gender distribution in these mental health facilities (WHO, 2007).

However, that notwithstanding, in a situational analysis conducted in South Africa, 4 out of 9 provinces indicated that there was no formally defined minimum data set of items to be collected for mental health (Lund *et al.*, 2008). It was noted that there was generally a lack of accurate routinely collected data regarding mental health services; for instance, no province was able to report a breakdown by gender, age or diagnosis of mental health service users at the mental hospital, psychiatric inpatient units in general hospitals, outpatient facilities, day treatment facilities or community residential care (Lund *et al.*, 2008; Lund & Flisher, 2002a, 2002b, 2003). Additionally, some of the people with mental conditions use both traditional healers and modern mental health facilities either simultaneously or sequentially, but there is no proper recording and reporting system as to the magnitude of these service users (Lund *et al.*, 2008).

Although there is no specific research conducted on the impact of the lack of a mental health information management system in South Africa, research from other areas has shown that

lack of accurate information leads to inappropriate policy formulation and a significant number of mentally ill patients discontinuing their treatment due to problems in getting appropriate information and communication on healthcare delivery services (WHO, 2004). As a result of patient discontinuation of treatment, high rates of readmission, patient dissatisfaction and poor healthcare outcomes have been reported (Van Walraven, Seth & Laupaos, 2002). For example, 50% of patients discontinue receiving health care due to errors in information and communication management worldwide (Moore Wisnivisky, Williams & McGinn, 2003). It was further noted that error or incorrect information are sometimes recorded in discharge communications and is rarely questioned once documented as part of the medical records (Adhiyaman, White & Shah, 2000; Bruffaerts, Sabbe & Demyttenaere 2004).

Although South Africa has had a DHIS for more than a decade, it has challenges in its implementation. Access to structured and comprehensive information and communication between groups involved in treatment is critical for the patient to receive relevant care and treatment. Moreover, the essential information needed to strengthen the mental health services is always lacking for policy formulation, planning and decision making in low- and middle-income countries, including South Africa (WHO, 2009).

In summary, conditions for the management of mental health are complex, and there are many variables and specifications which need consideration. Therefore, looking at the significance of mental health problems in South Africa, where different aspects of patient care are delivered from very different sources, the need for a structured and comprehensive mental health information management system is crucial.

1.3 Problem statement

Studies have shown that about 50% of patients worldwide discontinue receiving mental health care associated with errors in information and communication (Van Walraven *et al.*, 2002). This has resulted in a high risk of readmission. Van Walraven *et al.* (2002) note that there is a high risk of readmission among patients treated in follow-up by a physician who has not received a discharge summary. In another study (Adhiyaman, White & Shah, 2000) 40% of patients had test results returned from the laboratory after hospital discharge and the physician were unaware of the results, of which 10% of them required some form of action. It was noted that mistaken information is sometimes recorded into discharge communications and is rarely questioned once documented as part of the medical records (Adhiyaman, White & Shah, 2000). Incomplete or inaccurate information about hospitalization of a patient can contribute to faulty medical decision-making or failure to adequately monitor a patient's condition during follow-up care. Delays and omission of discharge information lowers the quality of post- hospital continuity of care.

Moreover, a study has shown that there was a 77% decrease in the number of hospitalizations with participation in an Information Technology (IT) Aided Relapse Prevention programme (Spaniel, Vohldka, Kozeny, Novak, Hrdlicka, Motlova, Cermak & Hosch 2008). In some cases the help of information and communication technology (ICT) led to a 100% hospitalization decrease (from 25 to zero) in patients within highly cooperative patient-family member pairs (n=25) 34% of all patients during the follow up (Spaniel, et al, 2008)

South Africa has no Information Management Guidelines for mental health services; as a result, there are little available data about the nature and type of mental health information on district mental health services. For example, it was reported that information systems for monitoring community-based mental health care and staff are weak in South Africa. This is

clearly because records of diagnosis of mental illness, length of admission and gender distribution of mental illness are not routinely recorded (WHO, 2007). Consequently, mental health data remain inadequate and unreliable. This is a major obstacle in planning effective community mental health services. Therefore, in order to reduce the existing mental health information problems, the WHO suggested the need to develop MHIS guidelines in South Africa (WHO, 2007).

With this lack of adequate information, coordination and networking of information management systems on the huge number of cases with mental health conditions, not much is known in the Western Cape about the information pathway/flows at district health care level, as well as the implications and barriers of the existing trends of managing information systems. It is therefore necessary to identify the characteristic nature, type and constraints in the management of mental health information with particular emphasis to the Western Cape and to determine what framework would be suitable for the management of an MHIS in the Western Cape.

1.4 Aim of the study

The aim of the study was to develop a suitable framework for a DMHIS in the Western Cape. This was achieved by exploring the experiences of mental health nurses, facility managers, information clerks and caregivers in the DMHIS, and by identifying factors affecting the DMHIS, assessing mental health information infrastructure, and by conducting a systematic review to gather information on successful functional elements required for a DMHIS.

1.5 Research questions

The study has been guided by the following research questions:

1. What are the experiences of mental health nurses, facility managers, information clerks, caregivers and stable persons with mental conditions in the district mental health information system (DMHIS)?
2. What is the existing infrastructure for information processing and flow at district mental health services?
3. What factors are affecting the DMHIS?
4. What are the successful functional elements required for a DMHIS?
5. What framework would be suitable for a DMHIS?



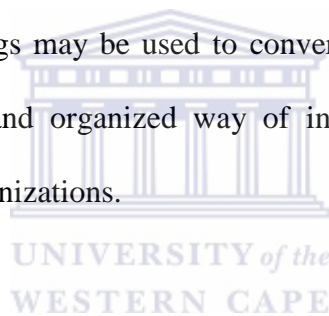
1.6 Objectives of the study

The following were the objectives of the study:

1. To explore the experiences of mental health nurses, facility managers, information clerks, caregivers and stable persons with mental health conditions in the DMHIS;
2. To assess the existing infrastructure for information processing and flow in the DMHIS;
3. To assess factors affecting the DMHIS;
4. To gather and organize information on successful function elements required for a DMHIS;
5. To develop a suitable framework for a DMHIS.

1.7 Significance of the study

Considering the existing mental health information management problems in SA, the WHO (2007) and Lund and Flisher (2006) highlighted the importance of developing a MHIS to monitor community-based mental health care. This is so because there is no mental health information management system in South Africa at the district healthcare level, despite mental health problems being a growing concern. It is against this background that this study was conducted, to determine the existing problems of the information management system in order to establish a framework for a district mental health information management system. The research findings would be valuable in terms of its possibility to inform policy makers and professional bodies to assist in the development of policy/guidelines for a MHIS. Furthermore, the research findings may be used to convert the existing fragmented type of MHIS into a more structured and organized way of information processing within and between health facilities and organizations.



1.8 Outline of the thesis

The thesis is organized into six chapters as follows:

Chapter one contains an introduction to the study, providing the general background to mental health services and the MHIS in SA, and states the problem statement, the significance of the study, aim, objectives and research questions.

Chapter two discusses a review of the literature on mental health policy in the context of an MHIS; it provides details on the MHIS, mental health policy analysis and theoretical underpinning of the study, and the DMHIS. It discusses activity theory as the theoretical

framework of the study and the WHO mental health information framework as a guiding principle of an MHIS.

Chapter three discusses the methodology of the study, providing information on the qualitative approach and intervention research design and development as the design of the study. The chapter has different phases: phase one is problem identification and analysis of the problem, phase two is gathering information to extract a successful model, phase three is the design and development of the framework using the results of the findings, and phase four is validation of the developed framework by consulting experts and refining the framework.

Chapter four deals with the findings of the study, while Chapter five presents the discussion.

In Chapter six, conclusions and recommendations are presented.

1.9 Conclusion

This chapter provided general background information about mental health services. It highlighted the significance of mental health problems in terms of accessibility of adequate mental health information for decision making and policy development, and for community mental health prevention and promotion of mental health. Many countries, including South Africa, have developed a DHIS for over a decade and half. However, in this HIS mental health has been given little space to address the huge mental health burden of the nation.

The chapter highlighted that there is no framework for mental health information recording and processing. The mental health information that is collected, processed and disseminated in the DHIS is not adequate for decision making and planning of effective community mental health services. Thus, little is known about the nature and type of mental illnesses. The chapter ended by providing the general aim of the study, objectives and research question, and lastly an outline of the thesis.



CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL PERSPECTIVES OF INFORMATION SYSTEMS IN MENTAL HEALTH CARE

2.1 Introduction

This chapter examines the concept of HIS, and the influence of technology in healthcare delivery. It provides an overview of the MHIS in general and DHIS in particular, under which a DMHIS is integrated at PHC level in the district health system. It explores whether mental health policy development in less developed countries considers and supports the development of an MHIS and, similarly, how an MHIS contributes to the development of mental health policy that is responsive to the needs of the community.

The chapter provides an overview of the theoretical development of Information Systems as a discipline and its applicability in research and contribution to the development of healthcare information systems and mental health care in particular. Many scholars identified and/or used activity theory as the framework for Information Systems (IS) research. The chapter further discusses how activity theory as the theoretical framework of this study structures and guides it.

2.2 HIS: Concepts and influence of IT on health care

HIS refers to the interaction between people, process and technology to facilitate and improve the quality of healthcare services. Haux (2006) states that analysed data provide information and knowledge in healthcare services. The aim of a HIS is to contribute to a high-quality,

efficient patient care (Haux, 2006). Health informatics is the field that is concerned about the cognitive information processing and communication tasks of healthcare practice and research, including information sciences and technology that facilitate the tasks (Haux, 2006). Reliable evidence-based information is the basis of the decision-making process in any health system, such as in health policy development and implementation, governance and regulation, health research and human resource development, health education and training, service delivery and financing (WHO, 2008). The following quote illustrates the key functions of a HIS:

The health information system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. The health information system collects data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making (WHO, 2008: 2).

Health informatics tools include computers as well as clinical guidelines, medical terminologies, and information and communication (Cornick, 2006). Moreover, health IT is the application of information processing involving computer hardware and software that deals with the storage, retrieval, sharing, and use of healthcare information and decision making (Goldschmidt, 2005).

Another important terminology in HIS is electronic medical record (EMR), which is central to any HIS. The EMR is a system to record individual health records on the computer, which is usually accessed through a computer network (Medical Insurance Exchange of California 2008). The Universal Electronic Patient Record (UEPR) is a system that electronically stores individual health information with a unique individual identifier. The UEPR system involves

capturing data/information, and storing, retrieving, transmitting, and manipulating healthcare-related data (MIEC, 2008).

One of the most important aspects of an HIS is creating the relationship between health providers and consumers (patients). It creates greater mutual understanding, building trust and loyalty, effective communication, involvement in decision making, satisfaction and better health-related outcomes (Richard & Ronald, 2008). However, there is always a challenge in standardising HISs, which also means standardization of the content and structure of EMRs (European Commission, 2004). In particular, a patient summary has been seen as the most appropriate way to establish eHealth interoperability. A patient summary includes patient history, allergies, active problems, test results, and medications. However, further information can be included, depending on the intended purpose of the summary and the anticipated context of use (Hayrinen, Saranto, Nykänenb, 2008). Another challenge is the format of information; it is realized that information is of little value if it is not available in formats that meet the needs of multiple users, policy-makers, planners, managers, healthcare providers, communities and individuals (WHO, 2008). Therefore, dissemination and communication are essential attributes of the HIS.

IT has a tremendous influence on health care, among which the WHO (2005 b) indicates its following key influence on health care: (1) it facilitates and assists with patient assessment, diagnosis and rehabilitation; (2) it facilitates access to health literature, online journals, books and databases; and (3) supports home-based caregivers to provide quality care for individual patients in their own homes. In addition, widespread diffusion of computers and cell phones enables low-income individuals to access technology for their health-related problems (Jensen, King, Guntzviller & Davis, 2010); accurate patient information transfer/

communication to PHC for continuity of care and follow up (Auerbach, Nelson, Lindenauer, Pantilat, Katz & Wachter, 2000; Curran, Gilmore & Beringer, 1992; Pantilat, Lindenauer, Katz & Wachter, 2001; Wachter & Goldman, 1996) is essential. Follow-up telephone calls and post-discharge support groups improve patients' conditions and reduce readmission rates (McIntosh & Worley, 1994).

The concept of a HIS is a general term in the healthcare field, within which there are several specific domains, such as the medical information system, MHIS, maternal HIS, DHIS, PHC information system and community mental healthcare information system. As the focus of this study is on the DMHIS, the following sections provide a general overview of the MHIS, and describe the DHIS specifically from the South African perspective, because the DMHIS is administratively integrated in the district health system.



2.2.1 An overview of the MHIS

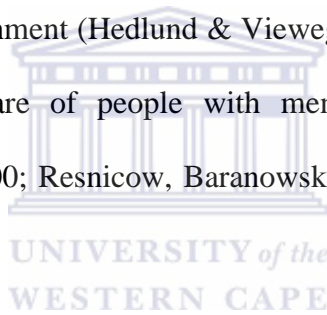
The primary purpose of an MHIS is to promote, facilitate, maintain or restore mental health (WHO, 2009). An MHIS is defined as “a system for collecting, processing, analysing, disseminating and using information about mental health services and the mental health needs of the population” (WHO, 2005:2). Similarly, Knight (1995) notes that an information management system offers healthcare providers an exceptional opportunity to improve standards of patient care, not only by accessing and exchanging relevant information on the individual patient, but also by immediate access to patient information and up-to-date research in the field. The author added that information resources should provide a vital and reliable picture of a country's mental health system. Some other countries have information systems that are neither comprehensive nor appropriate for mental health planning. The

WHO (2005b) states that the MHIS involves all organizations and resources that focus on improving mental health. The WHO report also explained the five different domains of health information, i.e. health determinants, health system inputs, health system outputs, health system outcomes and health status. Despite the tremendously important effects and value of information systems on mental health service improvement, the WHO (2009) reported that more than 24% of countries do not have an information system for collecting and reporting even basic mental health information. As a result Moore, Wisnivesky, Williams and McGinn (2003) suggested the need for developing MHISs to improve the effectiveness and efficiency of the mental health services and ensure more equitable delivery.

Thirty years ago some authors (Hedlund & Vieweg, 1982) already indicated that experiences with the MHIS described mainly planning, developmental and implementation stages, with relatively little attention given to follow-up reports dealing with long-term utilization and maintenance issues. It was reported that an increasing focus has been given to the responsibility of healthcare providers across the world to use outcomes measures to contribute to the ongoing review and development of clinical practice, as well as to inform service planning, policy development and the broader community (National Mental Health Strategy Australia, 2003). It was further highlighted that problems caused by lack of information include an inability to undertake rational planning, impeded accountability, and inability to monitor changes resulting from mental health reform.

The MHIS conceptual framework developed by the WHO (2005b) provides guidelines on the types of information that should be gathered, stored, processed, analysed and disseminated, and also indicates the importance of establishing appropriate information management systems within the health services. Poor information management systems always have incomplete or inaccurate information, which has a substantial impact on continuity of care, patient safety, patient and clinician satisfaction and use of resources (Moore *et al.*, 2003).

Although the literature review revealed that there is a paucity of published information on the development of MHIS, the application of Information Systems in mental health care started in the late 1960s and early 1970s by the Missouri Department of Mental Health in the United States of America. The development of MHIS was to support and document relatively traditional mental health practices. These involve clinical checklists; rating scales and associated computer-generated reports with each patient's admission; demographic data; psychiatric and physical examinations; diagnosis and treatment; periodic nursing observation; patient's alcohol history; psychological screening test; and information regarding patient adjustment difficulties at the time of admission and at three months follow-up following discharge. However, the MHIS was short-lived, because the consumers were not involved in the planning phase of its establishment (Hedlund & Vieweg, 1982). It is widely believed that information systems for the care of people with mental illness should be culturally appropriate (Brach & Fraser, 2000; Resnicow, Baranowski, Ahluwlia, & Braithwaite, 1999; Thompson et al., 2008).



As noted earlier, the MHIS should be developed to support and facilitate the mental health care services as well as administrative functions. However, many reports have indicated that staff members who are required to contribute to the information system do not have knowledge on how to use the data. This in turn creates indifference concerning the accuracy of data input, and mistrust that the information may be misused to the disadvantage of the employee (Hedlund & Vieweg, 1982). The reports also emphasize the importance of training staff members concerning information needs procedures and management of the information system data.

A systematic review of an observational study investigating information transfer at hospital discharge (n=55) and controlled studies evaluating the efficacy of intervention to improve information transfer (n=18) has shown that delayed or inaccurate information communication

between hospital and primary care physicians at hospital discharge may have substantial implications on continuity of care, patient safety, patient and clinician satisfaction and resource use (Kripalani, Lefevre, Philips, Williams, Bassaviah & Baker, 2007). The Joint Commission on Accreditation of Health Organizations requires that discharge summaries be completed within 30 days of hospital discharge (WHO, 2007). Others disputed the idea that the completion of a discharge summary within 30 days of hospitalization is insufficient from a patient safety perspective, and claim that it does not meet the needs of PHC providers and patients (Kripalani *et al.*, 2007; WHO, 2007). Others raised their concern about the availability of performance standards, because the extent to which clinicians successfully transfer timely and accurate patient information at hospital discharge is uncertain (Greenwald, Denham & Jack, 2007). Moreover, the importance of the continuity and quality of discharged patient information has been well described; the discharge summary is not the only tool for discharge communication, but does function as a significant portion of it (Greenwald, Denham & Jack, 2007; Toronto Central Local Health Integration Network, 2011).

Moore *et al.* (2003) and Kripalani *et al.* (2007) found that errors related to discontinuity of care occurred in about 50% of patients, and that lapses in communications related to diagnostic evaluations were associated with a significantly higher risk of readmission. Similarly, Van Walraven *et al.* (2002) note that there is a higher risk of readmission among patients treated in follow up by a physician who has not received a discharge summary. Moreover, it was reported that there are communication breakdowns, such as care providers that do not effectively or completely communicate important information among themselves, to the patient, or to those taking care of the patient. On the other hand, in a population-based cohort study in Canada patient follow-up with the same physician who provided in-patient care had a 5% decrease in the relative risk of death or readmission (Van Walraven, Mamdani,

Fang & Austin, 2004). Another study has shown that in about 40% of patients test results return after hospital discharge, and the physicians are commonly unaware of the results – even though about 10% of them require some form of action. Furthermore, erroneous information sometimes enters into discharge communications and is rarely questioned once documented as part of the medical records (Adhiyaman *et al.*, 2000).

Incomplete or inaccurate information about the hospitalization can contribute to faulty medical decision making or failure to adequately monitor a patient’s condition during follow-up care (Archbold, Laji, Suliman, Ranjadayalan, Hemingway & Timmis, 1998; National Transition of Care Coalition, 2010). To promote patient safety at transition of care, the timelines, accuracy and relevance of discharge communication can be improved substantially through health IT (Archbold *et al.*, 1998; Liewlyn, Ewins, Horn, Evans & McGregor, 1988; National Transition of Care Coalition, 2010).

In summary, the MHIS is useful in improving mental health through accessing and sharing up-to-date evidence-based information. The MHIS provides a reliable picture of mental health needs in a country. It informs service planning, policy development and development of clinical practice. Health IT can promote patient safety and improve discharge communication. However, it was indicated that despite the importance of information systems for mental health care, one-third of developing countries do not have information systems for collecting and processing mental health information. The lack of information systems has a negative effect for rational mental health service planning and impedes accountability, and to monitor changes several scholars and stakeholders stressed the need for developing MHIS. It also highlights the importance of consumers’ involvement in the planning and development of MHIS, and indicates that MHIS should be culturally appropriate.

The problem of discharge summaries and patient information transfer between health institutions and its impact on continuity of patient care and outcomes was noted. In addition, the effect of poor-quality information recording and processing on medical decision making and monitoring of patient conditions was discussed. The limited knowledge level in information processing and utilization among staff members highlighted the importance of training staff in information systems.

2.2.2 DHIS

A district health system is based on the principle of PHC, and comprises a defined population (50 000-500 000 people) living within a clearly delineated administrative and geographical area (DoH, 1998). SA developed a DHIS in 1998 (DoH, 1998). The concept of a DHIS comprises facility-based HIS and DHIS. The facility-based information system feeds into the DHIS. A DHIS gets patient data from both computer- and paper-based systems. The requirements for developing a DHIS are to improve the existing facility-based information system; decentralize the responsibility for PHC to district level; to support improved district health management and planning; and to improve health status of the community through having objective information on which to base decisions (DoH, 1998). However, the implementation of the DHIS is facing challenges. Kumar (2005) noted that the DHIS lacks in-built evaluation mechanisms and has no space for continuous research and community participation. The author further indicated that there is an intrinsic lack of interest in information systems among many clinical staff. They see their role as limited to the clinical care of patients and reject the notion that they have a wider role in managing information. This disinterest can continue unless clinicians see the benefit arising from information and understand its value and potential.

It has been suggested that the information system should be made more clinically appropriate, timely, accurate and useable (Kumar, 2005). The community information system must be person-based, integrated, operational and secure, so that information is only available on a need-to-know basis (Knight, 1995). Lack of evaluation criteria presents a major shortfall in the design, implementation and operation of a DHIS. As a result, there is need for designing a DHIS model to have built-in sets of evaluation criteria which should be used in a phased manner. Implementation evaluation criteria should be used to monitor the process, and post-implementation evaluation criteria should be applied to assess the system's effectiveness (Odhiambo-Otieno, 2005). A study was conducted to assess the extent to which hospitals in the Western Cape are compliant with the provisions of the mental health Act and to report on some indicators of the quality of mental health care (Lund, Stein, & Flisher, 2007). The findings indicated that there was low response rate by general hospitals due to a lack of systems for gathering mental health information, and a lack of transparency regarding mental health care (Lund, Stein, & Flisher, 2007). Furthermore, there are inadequate national indicators for mental health service; for example, PHC level 1 indicators included "mental health visit"; there was a lack of accurate, routinely collected data regarding current mental health status, service provision and resources, and little use of data collected from services for mental health policy and planning (Lund, Kleintjes, Kakuma, Flisher and MHaPP Research Programme Consortium, 2010).

Administratively a DMHIS falls within the district health system, and they also feed into the DHIS. The current mental health information collection, processing and utilization within the DHIS are not adequate enough to address the huge gap in providing reliable mental health information for policy formulation, decision making, and planning of effective mental health services in the PHC district health system. Moreover, incomplete or inaccurate information

has a substantial impact on continuity of care, patient safety, patient and clinician satisfaction and the use of resources (Moore *et al.*, 2003). The document review revealed that mental health is not included among the provincial priority agenda for PHC. This has created a major concern that mental health is being neglected in the district health system. In addition, many people have little information about mental illness and hold negative attitudes towards people with mental illness (Hugo *et al.*, 2003; Dirwayi, 2002). A WHO report (2007) indicated that a lack of attention to mental health services could seriously compromise the achievement of the Millennium Development Goals (MDGs) in low- and middle-income countries (Miranda & Patel, 2005).

In summary, it is therefore, for better mental health services there should be a better MHIS; there should be standardized and appropriate mental health information management systems within the district mental health services. Thus, it is argued that developing a DMHIS has enormous advantages for improving mental health services through collecting adequate and reliable mental health information for sound policy formulation, decision making and planning an effective mental health service. It also helps to provide well-grounded information to educate the community about mental illness and reduce the stigma, and facilitates research activities that create a platform where the voice of people involved in and affected by mental health may be heard and draw the attention of decision makers.

2.2.3 Different stages of mental health information collection and processing

The main stages of an MHIS include: (i) collecting – gathering of data; (ii) process – movement of data from the point where it was collected to the point where it can be collated and prepared for analysis; (iii) analysis – examination and study of the data; (iv) dissemination – communication of the results of the analysis; (v) use – application of the data

to improve service delivery, planning, development and evaluation (WHO, 2005b). It is a sustainable method of gathering, analysing, disseminating and using information that is built into the workings of mental health services.

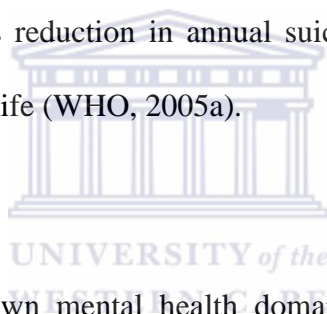
It is important to note that not all information needs to be processed at central level; some information may be retained in a health facility for analysis and use within that facility. In the reporting system, the data flow from local areas of central government, and it is rare that feedback would return to those who collected them in the first place. WHO has developed a model for an optimal mix of mental health services, known as the WHO pyramid framework, which was used to help organize the place of collection as well as the type of information that needs to be collected (WHO, 2005b).

In order to help the MHIS planners to make decisions, it is necessary to distinguish between the different types of information needed. These are: episode-level information, required to manage an individual episode of service contact; case-level information, required to care for an individual service user; facility-level information, required to manage the specific service facility and whether the facility is a specialist institution, a mental health ward in a general hospital, a community mental health team, or a PHC clinic; and system-level information, required to develop a policy and a plan for the mental health system as a whole (WHO, 2005b).

2.2.4 MHIS indicators

One principle in an effective MHIS is the use of well-defined indicators. Indicators are measures which: (i) summarize information relevant to a particular phenomenon; (ii) can be used to indicate a given situation; and (iii) can be used to measure the summarized

information relevant to the mental health services and a population that it serves (WHO, 2005 b). There is a difference between the indicators and raw data or data elements. Indicators are aggregates of the minimum data that have a denominator. Both indicator and minimal data have value for information systems. The indicators can be used to measure various aspects of the mental health system. These are the mental health needs (percentage of the mental health population that belongs to a vulnerable group); inputs – resources that are put into the mental healthcare system, such as human resources, finances and medication, and budgets for mental health promotion programmes; activities of the services – processes which include the way in which care is delivered, for example, annual number of admissions to mental health hospital per 100,000 population; and outcomes – effect of the service on mental health of the population being served, such as reduction in annual suicide rate, reduction of symptoms, level of disability and quality of life (WHO, 2005a).



Different countries have their own mental health domains and indicators. For example, Scotland has 2 categories and 55 indicators; the United Kingdom has 11 indicators; Australia has 9 domains, 24 subdomains and 15 indicators; the United States of America has 4 domains and 44 indicators; the European Union has 9 domains and 35 indicators; while the WHO has 6 domains, 28 aspects and 156 indicators (Han *et al.*, 2012). Indicators should be specific, reliable, valid, cost-effective and ethical. However, in practice it is rare to find indicators that meet all the needed criteria at the same time. Furthermore, it is also important to consider what an indicator measures, since they can be affected by various factors. In this regard it has been suggested that mental health indicators should be feasible and acceptable for use by different states (Korkeila *et al.*, 2003). Besides the relevance to mental health policies, indicators should be relevant for practical purposes. They should generally promote mental health, rely as much as possible on information already available and enhance the visibility of

mental health issues, as well as the need for infrastructure, process and outcome indicators (Korkeila *et al.*, 2003; Perlman *et al.*, 2013).

2.2.5 District mental health information flow

The movement of information begins with the collection and compilation of information by health workers at the facility. The data flow policies are from lower to higher level, and the information required at higher level is always less. Data collected at facility level should be sent to the facility head nurse, who in turn compiles and checks the quality of data (DoH, 1998, 2011). The facility data are then forwarded to the district information centre, which collects data from all the clinics in the district (DoH, 2011), checks the quality of data to be sent to both the information system regional coordinator and the provincial mental health directorate and then to regional/provincial and national level. Information flow involves data processing, collation, analysis, interpretation, reporting, dissemination and then action (DoH, 2011). The HIS regional coordinator enters the data on a computer, and forwards the data in electronic format to the provincial level HIS directorate. The HIS regional coordinators also generate a clinic summary/feedback and return this to the district/regional mental health coordinators. They then return the clinic summaries back to the clinic head nurse, who in turn forwards them on to the mental health workers (WHO, 2005b).

At provincial level the HIS directorate receives data from all the district/regional HIS coordinators, and generates a regional summary. The mental health regional summary is then forwarded to the mental health directorate, which reviews and analyses the summaries. It then disseminates the findings and their implications for planning and service management back to the mental health district/regional coordinator. At each point, action must be taken regarding various aspects of planning, management and service delivery, depending on the service level

(WHO, 2005a). However, studies have shown that health professionals and policy-makers in Africa lack access to the information needed to make evidence-based decisions for effective healthcare (Pakenham-Walsh & Bukachi, 2009). A similar study has indicated that despite increased Internet connectivity and widespread use of mobile phones in sub-Saharan Africa, the region suffers from lack of information (Gebremichael & Jackson, 2006). At district level many healthcare providers lack reliable information for monitoring and planning the services. Often the information at facility and district levels is fragmented; at provincial level health managers often cannot access current data for programme planning and evaluation, and at national level policy-makers lack timely, relevant data on which to base decision making (Pakenham-Walsh & Bukachi, 2009).

The importance of political support for a comprehensive knowledge management strategy for the health sector should not be underemphasised, including the need for strategies to empower and better support system for health coordination and supervision. Inclusion in information flow requires channels and networking. In principle information should flow in both direction (vertically from lower level to higher level and then back from higher to lower level in the form of feedback, and also horizontally in the form of a patient information transfer/referral system). However, lack of information sources, poor coordination and fragmentation of information make this flow difficult in African countries (Buchanan & Gibb, 2007).

2.2.6 Mental health information management and information sharing

Health Information Management Systems (HIMS) refer to an information system specially designed to assist in the management and planning of health programmes, as opposed to delivery of care (WHO, 2004b). Health information management and information sharing

play critical roles in addressing the cost, quality and access challenges of the healthcare system (Vest, Zhao, Jaspersen, Gamm &, Ohsfeldt, 2011). The WHO indicated that investment in HMIS and information sharing could have multiple benefits, such as detecting and controlling emerging endemic health problems; monitoring progress, empowering individuals and communities with timely and driven improvement in quality of services; strengthening the evidence base for effective health policies; enabling innovation through research; mobilizing new resources; and ensuring accountability (WHO, 2004b).

Transparency and sharing health information is an important step to improve the efficacy and fairness of healthcare globally (Eldessouki & Smith, 2012). Although efforts have been made to improve information sharing and harmonize health technology assessment across countries, there are many barriers – such as different languages, lack of transparency, fragmentation of the available information and limited resources impeding information flow (Eldessouki & Smith, 2012). Moreover, the quality and outcomes of healthcare suffers due to patient health information residing in fragmented locations, for instance in the office of primary care physicians, hospitals and clinics, laboratories and radiology centres, health plans, pharmacies, nursing homes, and even with the patient themselves (Clark , 2012). As a result, the electronic exchange of information across the multiple entities that deliver care and services to a patient is a central and foundational component of coordinated, accountable, patient-centred care (Clark, 2012).

The data needed in comprehensive HMIS range from birth, morbidity and mortality data, type and location of health personnel, type and quality of clinical services provided at national and sub-national level, to population indicators such as demographics and socio-economic status (WHO, 2004a).The information can be divided into five different domains, namely: health determinants, health system inputs, health system outputs, health system outcomes, and health status.

An MHIS is a planning and service delivery tool used for improving effectiveness, efficiency and equity. As a planning tool it can offer a way of providing accurate, consistent information about a mental health service, and it helps to improve coherency of planning as rational planning is not possible without accurate information. Without accurate information policy-makers cannot evaluate the policy implementation and objectives of the policy (WHO, 2005 b). Furthermore, as a service delivery tool it can assist the service provider by recording and monitoring the needs of individual service users and also provide a means for reporting the interventions that are used. This in turn provides a continuous improvement in quality service provision (WHO, 2005 b). The author further added that accurate information is critical, because without it, policy-makers cannot assess whether policy objectives are being achieved.

2.2.7 DHIS software (DHISS)

The DHISs' software (DHISS) has been developed by the Health Information System Project (HISP) for use in a public HIMS (Shaw, 2005). DHISS is a flexible, open-source, free software developed for public HIMS by the international HISP group, which gives countries the opportunity to obtain the software free of charge (Braa & Hedberg, 2002). Open software may be freely probed, customized and modified. This is the cheapest way of generating software suited to the needs of a state. Wherever it is used, those with programming skills can easily modify it to meet their needs – and in turn are encouraged to share their improvements as open source (Braa, Hanseth, Heywood, Mohammed & Shaw, 2007; Fogel, 2005).

The DHISS has been adapted by several developing countries since 1994 (Shaw, 2005). The core development activities are managed and coordinated by the Department of Informatics in Oslo and supported by the Norwegian Research Council (NORAD) and the Norwegian Centre for International Cooperation in Education. Since then, DHISS has been piloted in

South Africa, Mozambique, Tanzania, Malawi, Ethiopia, Vietnam, India, and others. The DHISS was accepted for national roll-out by the government of South Africa in the year 2000 (Braa, *et al.* 2007; Lungo, 2008). In India the DHISS was piloted in Chittoor district in Andhra Pradesh from 2001 to 2004. HISP has now entered into a memorandum of understanding with the government of Andhra Pradesh to implement a HIMS in two districts using the DHISS, integrating it with the existing name-based FHIMS software of the government of the region (Braa *et al.*, 2007; Braa, Morteiro & Sahay, 2004).

It has thus been continuously adapted to field conditions by participatory effort between healthcare and software professionals in several developing countries since 1994 (Braa *et al.*, 2004). This has resulted in the DHISS software addressing vital issues such as user-friendliness, data accuracy, adaptation to local language and design and use of indicators based on local needs. The software allows data to be transmitted to other users, both horizontally (at PHC or district levels) or vertically (up the hierarchy to national level). Keeping in mind the dynamic nature of healthcare management, the software has been designed to be extremely flexible in order to address changing needs at field level over time and space. Besides serving as a tool for gathering, transmitting and storing data, the DHISS is designed especially to address data analysis and hence the use of health information (Braa *et al.*, 2004).

The DHISS facilitates to collect accurate and valid data, as well as storing, sharing, transmission and use of health data in and between every level of a district health system, from sub-centre to district and at state level. It allows drilling down or aggregation of data at any and every level of the health system (Nordal, 2006; Braa *et al.*, 2004; Moctrus, Fielding & Herbsleb, 2000). In order to process quality information on day-to-day activities, the DHIS requires an information audit system to guide and regulate what information is to be

collected, and how it should be processed and utilized (Botha & Boon, 2003). The next section briefly discusses the need for an information audit system.

2.2.8 Information audit system

An information audit system is “a systematic examination of the information resources, use and flows with verification by reference to both people and existing documents in order to establish the extent to which they are contributing to the organization’s objectives” (Botha & Boon, 2003). In everyday use, information guides and informs individual and organizational decision-making processes; effectively managed and processed information underpins innovation and growth (Buchanan & Gibb, 2007). The key questions that need to be answered in an information audit are: who collects the information and for what purposes?; what type of information is collected and in what form?; when is information collected and how often is it reported and acted on?; where is information sent and analysed?; why is the information collected and how is it transformed; how important is the information to the task or process?; and what is done with the information? (Buchanan & Gibb, 2007).

In summary of this section, information is the basis of any policy formation and decision-making process. A policy that is not based on reliable evidence-based information has always encountered problems with its implementation. The following section discusses some of the mental health policy formulations in Africa and South Africa in the context of mental health information management systems.

2.3 Mental health policy guidelines in the context of information systems

A mental health policy is an essential tool used to promote mental health, prevent disorders, reduce the burden of disease, and treat and rehabilitate people with mental health problems in a country. Sound and reliable mental health information is the foundation of any policy

formulation and decision-making process. On the other hand, policy should also provide directives for mental health information processing and utilization (Lund *et al.*, 2010; WHO, 2008).

Evidence-based, formulated and implemented mental health policy has a significant impact on the mental health of the population concerned. As noted in the literature, the outcomes of a mental health policy include improvement in the quality of service delivery, accessibility, community care, and engagement of people with mental disorders and their caregivers as well as several other indicators of mental health (Flisher *et al.*, 2007; WHO, 2005c). However, despite recognition of the benefits of the implementation of a national mental health policy, 40.5% of countries do not have a mental health policy, and 30.3% do not have a mental health programme (WHO, 2001). The WHO mental health policy has twelve major components: legislation and human rights, financing, organization of services, planning and budgeting for service delivery, advocacy, quality improvement, workplace policy and programmes, improving access and use of psychotropic medication, information system, human resources and training, child and adolescent mental health, and research and evaluation. Each of these components has its own guidelines and framework and is directed by its own mandated person (WHO, 2005 b).

Any policy not based on reliable evidence-based information is likely to encounter problems with its implementation. In this regard, the WHO and the South African mental health policy guidelines were compared (see section 2.5) as to whether the mental health policy components include a mental health information management system. The WHO provides guidelines on the process of developing mental health policy. Mental health policy is defined as an organized set of principles, values and objectives for improving mental health and reducing the burden of mental disorders in a population (Funk *et al.*, 2005). The mental health policy development and process aims for implementation of strategic actions that

favour the promotion of mental health, prevention of mental disorders and treatment and rehabilitation (Draper *et al.*, 2009). According to the WHO a record 53% of African countries have no mental health policy, and of those countries which do have mental health policies, many were not informed by reliable, evidence-based information on mental health needs within the country, and these have many practical difficulties with implementation (WHO, 2005b). Therefore, gathering sound and reliable evidence-based information is the first step in the development of a sound mental health policy that is responsive to the needs of the mental health community (Lund *et al.*, 2010; WHO, 2005c).

2.3.1 Mental health information gathering for decision-making process

The formulation of policy should be based on up-to-date and reliable information concerning the community, mental health indicators, effective treatments, prevention and promotion strategies and mental health resources (WHO, 2004a). Mental health information should be developed in consultation with consumers and families, so as to meet concerns about confidentiality and to develop a sensible procedure for accessing information (WHO, 2005b). Common standard IT allows local information systems to communicate across organizational and geographical boundaries as people with mental disorders move around. Professionals in charge of mental health in health ministries and health districts should develop a common basic information system in line with the technical capacity. This makes data available for monitoring and evaluation of mental health services. In any MHIS developing indicators is the first step that should be performed. The following are mental health indicators as described by the WHO for mental health (WHO, 2004a, 2005b):

- Magnitude of risk factors for mental health, such as the use of alcohol and drugs, number of victims of violence in the home, etc.

- Rate of mental health disorders; i.e. incidence and prevalence rates, diagnosis at discharge from hospital and/or when consulting at PHC specialist facilities.
- The consequences of mental disorders, i.e. disability and mortality.
- The number of human and physical resources, i.e. PHC workers trained in mental health, mental health professionals and staff, hospital beds, places in day hospitals, halfway houses and shelter homes, medication.
- Quality of services, i.e. the extent to which facilities and programmes meet standards, prescription patterns, compliance rates, involvement in rehabilitation programmes.
- Efficiency of service utilization, i.e. numbers of hospital admissions and readmissions, average duration of admissions, bed occupancy, outpatient attendance, consumers on cash registers, filled day service places.
- Costs, i.e. intervention costs such as for one day in hospital, one day in a shelter, one session with a health worker, facility operating cost, capital costs, transport costs, overheads.
- Outcomes, i.e. symptom relief, quality of life, level of functioning, consumer satisfaction, defaulter rate, relapse rate.

These are measurable indicators for mental health, and the establishment of a mental health information recording and processing system should be based on these indicators. Therefore, mental health policy development should be expected to address the mental health indicators to measure the implementation of policy and mental health service improvement.

2.3.2 Mental health policy conditions in African countries

Despite the growing burden of mental illness and the level of suffering of individuals and society at large, efforts to address the problem are unsatisfactory in African countries due to very low budgetary resources, competing and conflicting health system needs, scarcity of

mental health personnel, and stigma associated with seeking psychiatric help (WHO, 2010; Abel, Kestel, Eldemire-Shearer, Sewell, & Whitehorne-Smith, 2012; Draper *et al.*, 2009; Gureje & Alem, 2000). For example, of the 24 million people with schizophrenia worldwide, half of those did not receive appropriate care – 90% of these living in developing countries. As indicated earlier, almost 50% of African countries do not have a mental health policy and 64% of countries either do not have mental health legislation or their legislation is outdated (WHO, 2010; Flisher *et al.*, 2007). In cases where legislation does exist, much of this mental health legislation violates rather than protects the rights of people with mental health disorders (WHO, 2010; Flisher *et al.*, 2007; Gureje & Alem, 2000).

Although mental ill-health imposes a significant burden on the economy, there is evidence that a range of clinical, social and economic interventions can have benefits for people with mental disorders. However, mental health receives a low priority on many African countries' policy agendas across a range of sectors (Lund & Flisher, 2006). A study conducted to compare the mental health policy processes of four African countries (Ghana, South Africa, Uganda and Zambia) using semi-structured interview and document analysis found that mental health policy in these countries was weak, and that it had been in draft form for years or was non-existent (Omar *et al.*, 2010). Furthermore, the findings revealed that although Ghana and Zambia have approved national mental health policies which were developed in 1994 and 2005 respectively, the Zambian mental health plans had not yet been developed and its implementation was poor. Similarly, the Ugandan mental health policy has remained in draft form since 2000, although some implementation was reported through annual mental health plans (Omar *et al.*, 2010; Faydi *et al.*, 2011).

South Africa and Uganda both have draft policies undergoing further revisions. In South Africa, although the mental health policy guideline was approved in 1997, a formal mental health policy has not yet been formally adopted, and its implementation has been inconsistent

(Lund & Flisher, 2006). Key values and principles, such as integration of mental health into general services, are strongly addressed in the policies of Ghana, South Africa and Uganda, whereas the community-based component is strongly addressed in the policies of Ghana, South Africa and Zambia. Evidence-based mental health practice has also been poorly addressed in these three countries' policies (Uganda being the exception). Moreover, human rights issues were poorly addressed in the Ghana, South Africa and Uganda, but strongly addressed in the Zambian mental health policy; however, none of these countries' mental health policies address the need for a MHIS (Faydi *et al.*, 2011).

Omar *et al.* (2010) have argued that of the few research studies conducted in Africa, most health policy researchers focused on the content of the policy rather than the processes of health policy development and implementation. The conceptual framework of mental health policy processes involves a wider scope, such as political, socio-economic and cultural factors. Furthermore, a solid policy and legislative framework with clearly defined roles and responsibilities for the mental health players, including health professionals and government officials, must be developed. Mental health legislation includes the right to access quality healthcare, the right to confidentiality, the right to information about one's own care, the right to consent to or to refuse treatment and admission to mental health facilities, freedom from cruel, inhuman and degrading treatment, freedom from discrimination, and the enjoyment of basic social, economic and cultural as well as civil and political rights (WHO, 2010; Faydi *et al.*, 2011). However, these rights are, in most cases, violated due to poor budgetary allocation to mental health-related issues in Africa. Perhaps this could be explained by the fact that in many African countries there is a low level of financial and human resources for health in general (WHO, 2010).

Examination of financial allocations to mental health in some African countries shows that Ghana devoted the largest proportion (approximately 6% of government health budget) to

mental health, while Zambia devoted only 0.4%, and Ugandan government mental health expenditure is normally around 1% (Lund *et al.*, 2008). As for South Africa, there is a reported wide variation between provinces in the proportion of the health budget allocated to mental health, ranging from 1% in the Northern Cape to 8% in Mpumalanga (Lund *et al.*, 2008).

In summary, as indicated in Chapter 1, the under-allocation of mental health budget is not only due to lack of resources, but more to ignorance, negative attitudes/stigma associated with mental illness and mismanagement of the resources. Unfortunately, this has a significant negative impact on the mental health policy development and implementation in most African countries, including South Africa.



2.3.3 MHIS and policy development in South Africa

An MHIS is central to inform sound policy formulation and appropriate mental health service planning. However, according to a study by Flisher *et al.* (2007), mental health information on service utilization was only available from four provinces in South Africa. The percentages of users who are female or children or adolescents were not available at the time that this research report was compiled. Furthermore, data are not routinely collected in any province. Moreover, records of diagnosis of users treated in outpatient facilities are also not kept in South Africa (Flisher *et al.*, 2007; Lund *et al.* 2008, Draper *et al.*, 2009). If they are kept at all, they are often contained in individual case files, but not used for service planning. In addition, data on the average number of contacts per user per year was only available from two provinces, namely the Western Cape (1.2 contacts) and North West (1.7 contacts) (Flisher *et al.*, 2007).

In terms of available interventions, two provinces reported that 1-20% of users had received one or more psychosocial interventions in the past year, while another two provinces reported that 21-50% of users had received such interventions (Lund *et al.*, 2008). The remaining provinces had no record of this at all. Moreover, the DoH does not keep statistics regarding gender and age in day treatment facilities (Lund *et al.*, 2008).

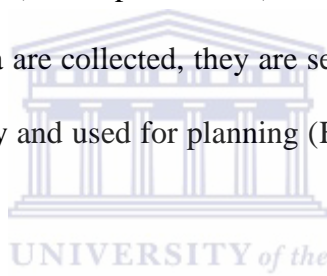
In general, the MHIS was not reflected in the mental health policy. It was reported that mental health information on vulnerable populations, such as on females, children and adolescents suffering from mental disorders, was not available (Lund & Flisher, 2006). Therefore mental health information collection and processing was not addressed as an important policy component for planning and implementing mental health services in South Africa (Lund & Flisher, 2006).

There is emerging research evidence that mental ill-health is strongly associated with poverty and many aspects of social deprivation associated with poverty, inadequate housing and a low level of education (Araya Lewis, Rojas & Fritsch 2003; Flisher *et al.* 2007). As in many parts of the world, mental health conditions are given low priority both on the national and provincial policy agenda in South Africa. The association of the poverty cycle and mental health conditions is poorly understood and inadequately addressed in policy or service delivery (WHO, 2005c).

In South Africa, the national DoH has not officially adopted and implemented a national mental health policy; instead a set of national policy guidelines was developed and approved in 1997 (Flisher *et al.*, 2007). However, translation of these policy guidelines into provincial mental health policies and plans has not been consistent. The general policy-making process reflects the current historical context and policy reforms to improve service delivery to redress the unjust system of the past. Nevertheless, the development of the mental health

legislation (Mental Health Act 2002) is consistent with international human rights standards and is based on a thorough consultation process with a range of stakeholders (Faydi *et al.*, 2011; Draper *et al.*, 2009). This Act is an important milestone in the development of the mental health system in South Africa. However, it is still inadequate to bring about desired change and reforms to the mental health system, as originally planned (Lund, et al, 2010).

There are major limitations to policy implementation due to the following reasons: firstly, there is wide variation between provinces in terms of availability of service resources for mental health. Secondly, there is generally a lack of accurate, routinely collected data regarding mental health service provision. As a result, the information on current service resources (budget, staff, facilities) and provision (admissions, outpatients) is extremely irregular. For example, if the data are collected, they are seldom made available, and equally seldom reported on systematically and used for planning (Freeman & Pillay, 1997; Flisher *et al.*, 2007).



Comparatively, looking at continent level, South Africa has more resources for mental health services, including human resources, facilities and available psychotropic medications. Since the Mental Health Care Act of 2002 a review board has been established in all the province, the establishment of 72-hour assessment facilities in district general hospitals and the Disability Grant, which appears to suggest an improvement in mental health care in the country (Lund *et al.*, 2008).

However, regardless of the strong points recorded, there are several weaknesses. For instance, the absence of an officially endorsed mental health policy, the inadequacy of provincial plans and budgets to implement the national mental health policy and legislation, and a lack of adequately trained staff all drag the progress in mental health care backwards. To compound the problem further, there are no nationally agreed indicators for MHISs. Additionally, there

is limited scope of community-based mental health services and treatment protocols, and referral systems as well as standardized evidence-based training in MHIS for general staff. Moreover, intersectoral collaboration to address mental health is limited, with weak participation, planning and service development (Flisher *et al.*, 2007; Lund *et al.*, 2008; Draper *et al.*, 2009; Faydi *et al.*, 2011).

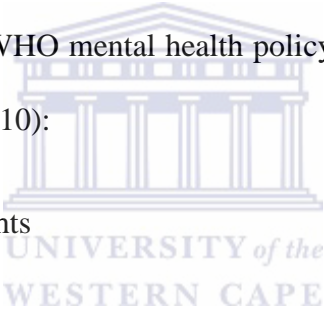
Moreover, the 1997 policy guidelines were drafted as an overview document, with the intention that there would be deeper and wider consultation with stakeholders and experts, especially in the area of child and adolescent mental health policy guidelines (WHO, 2007; Lund *et al.*, 2008). The policy guidelines mainly prioritized integrated mental health care and deinstitutionalization, and national and provincial operational plans to guide implementation of the policy (WHO, 2007; Lund *et al.*, 2008). Despite the approval of the 1997 policy guidelines for implementation, it has never been officially published nor widely circulated throughout the country due to capacity constraints within the national office. Also, due to lack of dedication and adequate evidence-based recorded information, the development of substance abuse policy guidelines has been dragging on for years without completion (Lund *et al.*, 2008).

The WHO (2010) and Flisher *et al.* (2007) reported on the new policy-making process of what is regarded as the first mental health policy in South Africa, which started in 2006. The draft of this policy was circulated for input to mental health stakeholders in the country, and a second round of consultation with provincial coordinators has been concluded and inputs from these consultations are being incorporated. Current DoH officials do not regard the 1997 policy as a mental health policy, but nevertheless, the 1997 guidelines include the following components (Lund *et al.*, 2008):

- Developing community mental health service

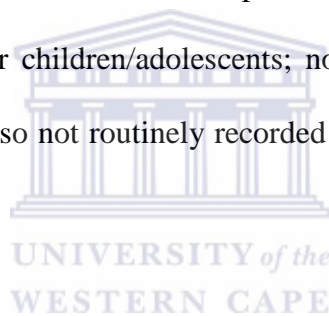
- Downsizing large mental health hospitals
- Developing mental health components in PHC
- Human resources and involvement of users and families
- Advocacy and promotion
- Human rights protection of users
- Equity of access to mental health services across different groups
- Financing
- Quality improvement
- Monitoring system.

Some of these mental health components are similar to those of the WHO mental health policy guidelines. However, the WHO mental health policy includes more components, such as information systems (WHO, 2010):

- 
- Legislation and human rights
 - Financing
 - Organization of services
 - Planning and budgeting for service delivery
 - Advocacy
 - Quality improvement
 - Workplace policies and programmes
 - Improving access and use of psychotropic medicines
 - Information system
 - Human resources and training
 - Child and adolescent mental health policies and plan
 - Research and evaluation.

Looking at the above list of mental health components for WHO and South Africa, the information system component was not included in the South African mental health policy. In the above sections 2.3.2 and 2.3.3, we have seen that many African countries, including South Africa, have mental health policies which are not grounded on reliable and sufficient information

In summary, there is a major concern about the capacity of staff and facilities to provide adequate mental health care in South Africa. There are also inadequate information systems for monitoring and evaluation of mental health care services at facilities and referral systems, and structured information pathways between and within the health services were not available. Furthermore, there are no records of the percentages of admissions to psychiatric inpatient units that are female or children/adolescents; nor are age categories known. The average length of admission is also not routinely recorded (Flisher *et al.*, 2007; WHO, 2005 b).



2.4 Information management system and activity theory as a theoretical framework

2.4.1 An overview of information management systems in general

The field of Information Systems was originally rooted in the management sciences, computer science, management and organizational theory, and accounting. Klein and Hirschheim (2008) and Hirschheim, Klein and Lyytinen (1995) recognized the different scholars that have contributed to the development of the theoretical concept of Information Systems in the 1960s and 1970s: for instance, Dickson developed Information Systems in behavioural sciences; Blumenthal contributed to development of reporting and control systems; Langefors developed formal specified technical information systems; and data-logical and info-logical were developed by Teichroew and Yourdon. Each of the above disciplines brought a unique perspective to the application of computers to organizations, and interest has since grown with the development of theory.

The first comprehensive attempt at the development of a management of Information Systems 'theory' was a framework for planning and development (King & Lyytinen, 2006). This had a scientific approach to determining an organization's information needs and developing the kind of system that is responsive to sound decision making (King & Lyytinen, 2006). However, Swanson and Ramiller (1993) looked at the field of Information Systems from a much broader perspective, such as computer-supported cooperative work, information and interface, decision support and knowledge-based systems, systems projects, evaluation and control, users, economics and strategy, and Information Systems research in general.

Subsequently the growth of the Information Systems field has manifested itself in many ways. For example, as the field has grown, new specialties and research communities have emerged, and the level of research has also increased dramatically (Klein & Hirschheim, 2008). There


are four information-processing usage eras. The first era was symbolized by automation of transaction processing, which led into the second era, during which the management information systems was characterized by using computers as instruments of control, integration and rationalizing administrative systems. The third era was ‘personal computing’, which boosted personal productivity and end-user computing as well as ‘administrative computing’. Last but not least is the fourth era, which arrived due to widespread networking on the Internet, where computers begin to look more like information appliances (Dahlbom & Janlert, 1996).

Therefore the main purpose of information systems is to facilitate work activities among human beings. It is thus a human activity system that describes an information system (manual or computer-based) in a collective work activity, either as a means of work or of coordination and communication (Engestrom, 2001; Kuutti, 1996). Kuutti (1996: 26) defined information systems development as “the process by which some collective work activity is facilitated by new information-technology through analysis, design, implementation, introduction and sustained support”. The IT artefacts that support information systems have evolved at a rate of change that makes the phenomenon of their use particularly difficult to study. However, activity theory can overcome these challenges (Kuutti, 1996).

It has to be emphasized that activities are not static or rigid entities, they are in constant change and development; however, the development is not in a predictable pattern (Kuutti, 1996). As activities are dynamic and in constant motion, it is important to analyze their development in order to understand them. Activity theory is helpful in analysing the elements and to gain an insight into the historical development of the context of the activity. Activity theory also anticipates the conflicts and contradiction that may occur in an information systems project (Engestrom, 2001).

Kaptelinin (2002) states that individuals may have different motives for doing the activity, which can vary, for instance, from cost reduction to improving customer care. The presence of contradiction is a driving force for change in the elements of activity and innovations in the activity systems (Kuutti, 1996; Engestrom, 2001). Therefore, in order to analyze the development of activity systems, activity theory is important to identify and resolve contradictions (Engestrom, 1999b). Moreover, activity theory as a study framework provides clarity to the concept of information science (Allen, Karanasion, & Slavova, 2011). In the following section, activity theory is described as the theoretical philosophical foundation of this study, to understand the application of HIS in the health sector, and to understand users' behaviour that can help design and develop the district mental health information framework.

2.4.2 Activity theory



Activity theory is rooted in socio-cultural and historical activity that initially was formulated by Russian psychologist Vygotsky between the 1920s and 1930s. Vygotsky was insightful into the dynamics of consciousness as essentially subjective and shaped by the history of each individual's social and cultural experiences (Engestrom, 1987; Engestrom & Miettinen, 1999; Kuutti, 1991). Activity theory is holistic and comprehensive in nature, and the essence is quite practical, particularly in studying real-world practice (Engestrom & Miettinen, 1999; Kaptelinin, Kuutti & Bannon, 1995).

Activity theory was the result of an effort to develop a new psychology based on Marxist philosophy; for instance, Vygotsky, Leontiev and Luria provided the original conceptual framework building directly on the theories of Marx (cited in Crawford & Hasan, 2006). They formulated a completely new theoretical concept to transcend the fundamental understanding of psychology which was dominated by psychoanalysis and behaviourism.

According to Crawford and Hasan (2006) the new orientation was a model of artefact-mediated and object-orientated action. The artefact has a relationship between the human agent and objects of an environment, and is mediated by cultural means, tools and signs (Bertelsen, 2000).

The basic principle of activity theory is objective-orientedness, the dual concept of internationalization/externalization, tool mediation, hierarchical structure of activity and continuous development (Hasan & Banna 2010; Engestrom & Miettinen, 1999, Kuutti, 1996). The principle of activity is the interaction between object (purpose) and subject (human), which is mediated by tools and socioculturally facilitated (Engestrom, 1999a; Kaptelinen, 2005). The general context of activity includes internal and external activities, which emphasizes that internal activities cannot be understood in isolation without analysing the external activities, and vice versa (Crawford & Hasan, 2006; Engestrom, 1999b). Thus, activity theory explains the relation of social factors and the interaction between the agents and their environment (Engestrom, 1999a; Kaptelinen, Kuutti, & Bannon, 1995).

According to the above principle of internationalization/externalization, shaping external activities ultimately results in shaping internal ones. Internationalization is the product of culture by socializing and training of the individual to be a team member in the activity system, whereas externalization is creation of new artefacts/tools through innovation (Engestrom, 1999a; Hasan & Gould, 2001). Here tools have two distinct purposes; first, they shape the way human beings interact with reality, and second, tools usually reflect the experiences of other people who have tried to solve similar problems at an earlier time and invented/modified the tool to make it more efficient (Engestrom, 1999a; Hasan & Gould, 2001; Kaptelinen, 2005). This experience is accumulated in the structural properties of tools (shape, material, etc.) as well as in the knowledge of how the tool should be used.

Activity theory is a distinguishing device between activity, action and operations. It is a collective phenomenon with an objective activity between the subject and the object of work, which is realized through conscious and purposeful actions by subjects (Nardi, 1996; Kuutti, 1996). Action is a goal-directed behaviour that can only be understood in the context of activity, and it has well-defined habitual routine operations. This has been discussed in detail below.

Different scholars have described and applied activity theory differently; for example, Vygotsky described activity theory as the concept of mediated action between stimulus, response and tools (Iivari & Lyytinen, 1998). Virkunen and Kuutti (1997) described the use of activity theory in the development of labour protection; Bodker and Gronboek (1996) used it to analyze the work of labour inspectors and videotaped work; Chistianssen (1996) applied activity theory to Internet computer use in the context of policy inspection; while Bardram (1998) used activity theory for planning in the case of hospital information system. Korpela, Mursu, Soriyan and Olufokunbi (2002) and Mursu, Luukkonen, Toivonen and Korpela (2007) illustrate in detail application of activity theory in the medical healthcare system, particularly with regard to curative and preventive aspects. The authors further elaborate the actions of individual actors and how to be organized through the means of coordination and communication by defining the rules and division of work between doctors and nurses, with medical records acting as a cooperative and communicative means (Korpela, Mursu, Soriyan, Eeroloa, Hakkinen, & Toivanen, 2004; Mursu *et al.*, 2007).

The principles of activity theory include activity as the basic unit of analysis, and being object-orientated and tool-mediated (Bannon, 1990, Kuutti, 1996; Engestrom, 2005). Participating in the activity involves performing sets of actions and operations, and subjects are enabled by a legitimate set of actions and operations. Actions are a conscious

representation of a desired outcome, which consists of internal as well as operational characteristics; operational characteristics are performed routinely in order to complete the action, subconsciously or automatically with technology (Hasan & Banna 2010).

The work of Vygotsky was further developed into a coherent and conceptual framework for a complete theory of human activity (Hasan, & Banna 2010). Leontiev’s three-level model includes activity, action and operation (see Figure 2.1), where activity is placed at the top of the hierarchy (Hasan & Banna, 2010).

Engestrom (1999b) expanded the triangle-shaped activity model of Vygotsky with more elements. This expansion of the model represented the social or collective elements in an activity system, rules and division of labour. The community consists of all subjects involved in doing the same work, and regulations and social relationships within the community which guide the activities and behaviour in the system, and relationships between the community and the object mediated by the division of labour. This representation of the model also differentiates between its object or purpose and its outcomes, whether intended or unintended (Engestrom, 1999 b).

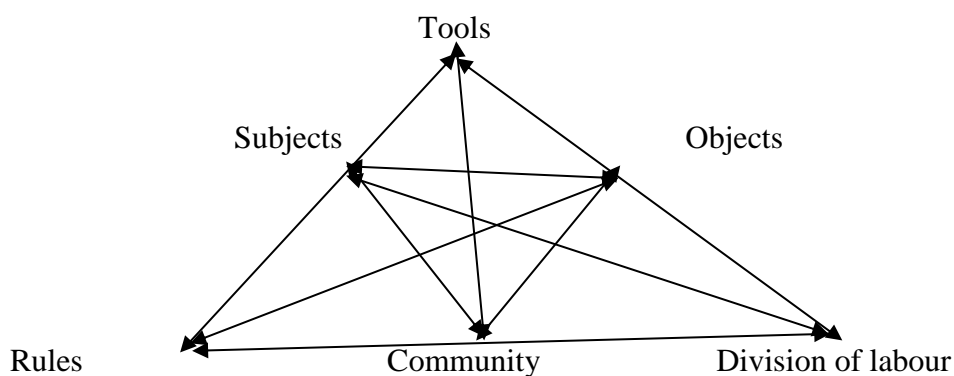


Figure 2.1: Engestrom’s Model of collective human activity (Engestrom, 1999 b)

In this model of activity, both internal and external tools are incorporated as a system, where internal tools would be the absorption of the inherited culture by learning and training, and external tools would be the new creations and innovations (Engestrom, 1999 b).

Activity theory has a broad and long research tradition. It emphasizes that human activity is culturally and historically formed, mediated, and defined by its objects. Hedegaard, Chaiklin and Jsensen (1999) provide a concise introduction to the tradition of activity theory. There are several widely different traditions within activity theory, but the activity-theoretical framework most commonly applied to information systems is developmental work research (Engestrom, 1999a). Activity theory in general and Engestrom's development work research in particular emphasizes that activity is a collective phenomenon which involves several actors.



2.4.3 Activity theory as the theoretical framework of the study

Activity theory has been used by many scholars/researchers as a theoretical framework for research and development of information management systems. There has been considerable work done on the application of activity theory to inform research; Engestrom (1987), Bodker (1990), Kuutti (1991), Star (1996), Kaptelinen (1996), Gould (1998), Korpela, *Soriya, & Olufokunbi*. (2000) and Suratmethakul and Hasan (2004) are some examples in point. The presentation of activity theory as an information systems research approach at the International Federation for Information Processing Working Group (IFIP WG) Conference in Copenhagen in 1991 attracted international interest. Kuutti (1991) argues that the object of analysis in information systems should be activity systems instead of information systems. The activity of any subject is a purposeful interaction of the subject with the world; it is a

mutual transformation of subject and object. Bodker (1991) discussed the potential of activity theory as an analytical framework in understanding computer-based artefacts as instruments for work activities and materials for systems design. Since the Copenhagen conference activity theory has been applied to research in the fields of human-computer interaction, computer-supported cooperative work, IS and Information Science (Bardram, 2000; Bertelsen & Bodker, 2000; Mwanza, 2001; Redmile, 2002; Hasan, Gould, Larkin, & Vrazalic, 2001; Wilson, 2006).

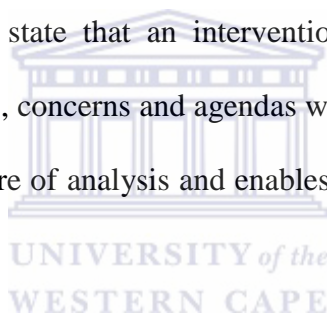
The basic unit of analysis in activity theory is an activity which ties individual actions into context; actions without context are meaningless. Leontiev (1978) elaborated on Vygotsky's concept of 'human activity mediated by tools and signs' and formulated a three-level hierarchical structure model where collective activity is the holistic basic unit of analysis.

Table 2.1: Leontiev's (1978) three-level model activity analysis

Unit	Directing factor	Subject
Activity	Object/motive	Collective
Action	Goal	Individual or group
Operation	Conditions	Non-conscious

Activity is a collective phenomenon with a shared object and motive. An activity is divided into actions through the division of work. An action is conducted by an individual or group using some kind of tool. The tool can be physical or intellectual or abstract, such as knowledge or skills. Usually an action is more limited in time and it is directed by a goal, which is more concrete than a motive. However, to have a reasonable action, the actor should consider her/his action in relation to the motivated activity. On the contrary, an operation is a non-conscious form of doing work, created by routine actions. However, the difference between activity, actions or operations is not clear-cut or stable (Hasan, 2012).

The application of activity theory in information systems research and practice often focuses on individual activity (or action) rather than collective activity. This is quite understandable, since the interest is usually in human-computer interaction, user interfaces, or computer-supported cooperative work (Hasan, 2012; Kaptelinen & Nardi, 2006). Thus the focus of analysis has been on the information system (or rather IT), not on the work activity system. There are certainly some exceptions, which have applied Engeström's developmental work research to study work activities (Helle, 2000; Kuutti, 1996; Hyysalo & Lehenkari, 2001). The activity- driven approach and model in this study emphasizes the collective nature of work activities, such as in multi-professional teams in the healthcare sector. This collective nature should be represented in the systems development process as a participative method. Engestrom and Kerosuo (2007) state that an interventionist researcher requires dialogue partners who share their emotions, concerns and agendas within the activity system. This also places the participants at the centre of analysis and enables the researcher to explore ways to engage and motivate people.



In this study activity theory provides theoretical and practical explanations of how an information system is applied to a healthcare system through the interaction of humans and computers. Figure 2.2 depicts how activity theory explains the process of this study.

Tools (Instruments/research methodology), previous research Results/literature

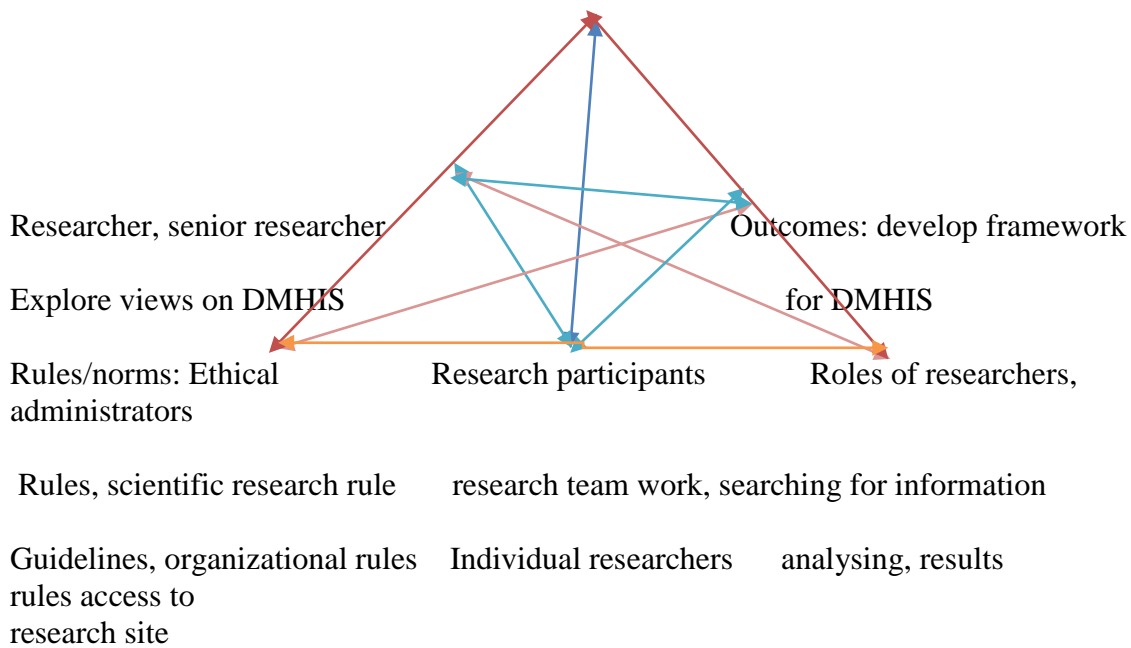


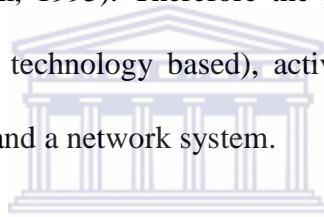
Figure 2.2: Application of activity theory as the theoretical foundation of the study (adapted from Engestrom, 1987)

The model contains mutual relationships between subject, objects and community (Kuutti, 1996). The tools and signs, rules and division of labour involve artefacts which are mediating the role. The relationship between subject and object is mediated by the tools (instrument) and signs (e.g. language). The relationship between subject and community is mediated by rules (e.g. laws), and the relationship between object and community is mediated by the division of labour (Kuutti, 1996).

As Figure 2.2 indicates, in this study, tools represent the research methodology, which includes qualitative interviews, instruments and systematic review. The subject is the researcher, in this case the PhD candidate, a senior researcher/supervisor/consultant. The object is the purpose for which the study has been conducted, which is to explore a DMHIS and develop a framework. The rules represent all the research ethical guidelines and principles, permission to use research settings and participants, informed consent and

management activity. Division of labour represents the roles/responsibilities of the researcher/supervisor and participants during the data collection, transcribing, analyzing, proofreading and validation process. This research involves the participants, in this case district facility managers, mental health nurses, information clerks and caregivers.

According to the activity system of research work, it is evident that a DMHIS does not stand in isolation, but is related and connected to various and simultaneous activities which have different objects. In application of this to the present DMHIS, the research work appears as a central activity and improving mental health information as the object activity. The central activity system includes activities where the objects and outcomes of the central activity system are embedded (Engestrom, 1995). Therefore the process of an information system requires tools (both manual and technology based), activities at individual and collective level, outcomes, communication and a network system.



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Activity theory emphasizes that activity is a collective phenomenon which involves several performers for a particular goal. For instance, to provide care to a patient at district mental healthcare level involves information clerks to register and provide folders; mental health nurses or doctors to assess, diagnose and provide treatment; a psychologist to provide psychotherapy; pharmacy to dispense medication; and social worker to attend to social needs. These are individual activities but collectively aimed at improving the health needs of a particular patient. Among these professional actors information sharing and communication about a particular patient is very important. Patient care also involves an efficient referral system to higher level for specialist services and back to district healthcare level for follow-up maintenance care of the patient. These require information communication tools (technology tools such as phone, fax, email and scans, and non-technology tools such as postal services, hand delivery). The amount and type of information content that goes into the

communication is also very crucial for the end user. The quality of health services provided, challenges and outcomes should also be communicated at higher health management level for the decision-making and policy formation process by using those tools.

Activity theory was used to provide a theoretical framework to the study by conceptualizing the nature of activity processes in the DMHIS, as explained in the above example. This means that activity theory as a framework of information systems guides the study by providing the type of elements such as the object (patient), subject (actors or performers), tools (technology and non-technology based), rules, roles of the community and outcomes. These are collective phenomena in activity theory as it is applicable for an integrated DMHIS. Activity theory also describes what activities should be performed at individual, group/club, organizational and national and international level. Nonetheless, as indicated in Chapter three (methodology), within the theoretical framework the design and development model of Rothman and Thomas (1994) was used to guide data collection, data analysis and framework development.

In summary, this section described the theoretical background of IS development and its scientific application to the field of science. It examined the background of activity theory, its theoretical concepts and principles in terms of mediating external and internal activities. Activity theory as a distinguishing device works between activity, action and operation. The section also discussed activity as a holistic and collective phenomenon with an objective activity between subjective and objectives of the work.

It was pointed out that the advancement of activity theory in IS research has attracted the interest of the international community. The section further illustrated the application of activity theory in the medical health system, particularly with curative and preventive aspects, division of labour between doctors and nurses, and medical records as a means of

communication. It also highlighted the relevance of activity theory as a theoretical foundation for this study, where the aim is to develop a framework for a DMHIS. In this case activity theory provides a comprehensive guide to elements of the information system, such as the manual and computer-based tools that facilitate activities, the system (infrastructure), communication, organizational context and individual or group (collective aspects). It also indicates how the information system helps and facilitates activities at various levels, such as at individual, group and organizational level.

2.5 Conclusion

This chapter examined the MHIS by highlighting its importance for mental health care such as improving the effectiveness and efficiency of mental health services and consumers' access to mental health care in an equitable and standard manner. It also identified problem areas such as the impact of incomplete and inaccurate information as well as the delay or omission of a discharge summary on patient continuity of care and satisfaction. The chapter also discussed mental health policy formation in the context of MHIS.

The literature review identified that the South African mental health policy does not incorporate an MHIS. It discussed the importance of mental health information gathering for the decision-making process and its usefulness in formulating evidence-based mental health policy, planning, decision-making, monitoring and evaluation. The chapter also described the theoretical development of an information system, and the concepts and principles of activity theory. It highlighted how activity theory mediates the socio-cultural activities, computer and human interaction, and outlined the role and advancement of activity theory in research and its application in health sciences. Lastly, it illustrated how activity theory was applied as a theoretical foundation for this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is organized into two sections. The first section begins by providing the rationale and justification for the choice of the methodology and goes on to provide an overview of the paradigmatic assumption, its motivation, the goal and a review of the objectives of the study. The second section comprises four phases: phase one discusses the implementation of intervention research design and development, and gathering information using interviews, FGDs and document review. It furthermore discusses the data collection process and analysis. Phase two deals with the qualitative systematic review method (protocol), critical appraisal and data extraction. It further highlights the rigour of the study and ethical considerations. Phase three discusses the design and development of the framework using the findings of phases one and two. Phase four discusses the validation of the framework. The review of the framework involved expert participants and consensus agreement. This is followed by the conclusion of the chapter.

The following section starts by discussing the different paradigms that are competing in the world, and providing the rationale for selecting the qualitative approach.

3.2 Choice and assumptions of the research approach

All research, whether quantitative or qualitative, is based on some underlying assumptions about what constitutes valid research and which research methods are appropriate. Creswell (2013) states that all qualitative researchers should approach their studies with certain assumptions related to the nature of reality. He describes the following philosophical

assumptions: ontological (the nature of reality) relate to the nature of reality and its characteristics; epistemological (how a researcher knows what he/she knows) by trying to get as close as possible to the participants being studied; methodological (the methods used in the process of research) – inductive, emerging and shaped by the researcher’s experience in collecting and analysing the data; axiological (the role of values known in the study) — actively reporting values and biases as well as the value-laden nature of information gathered from the field. In other words, the researcher studies people by observing them in their natural settings, by analysing the cultural symbol they use, the relationship of the researcher to the research, the role of value in the study, and the process of the research (methodological issues). Qualitative and quantitative methodologies are the two main competing paradigms. It is important to understand the theoretical background of these paradigms that guide and inform the choice of methodology.

Babbie (2001) asserts that a paradigm is the fundamental model or frame of reference to organize our reasoning. Guba and Lincoln (1994) note four paradigms that are competing for acceptance in informing and guiding inquiry, particularly qualitative research. These paradigms are positivism, postpositivism, critical theory and related ideological positions, and constructivism. According to Comte, true knowledge is based on the experiences of the senses and can be obtained by observation and experiment (Dash, 2005). Positivist thinkers adopt scientific method as a means of knowledge generation. This has to be understood within the framework of the principles and assumptions of sciences. With this assumption of science, the ultimate goal of science is to integrate and systematize the findings into a meaningful pattern or theory which is regarded as tentative and not the ultimate truth (Dash, 2005).

Although the positivistic paradigm continued to influence educational research for a long time in the latter half of twentieth century, it has been criticized due to lack of regard for the

subjective status of individuals. This is so because it regards human behaviour as passive, controlled and determined by external environment. Furthermore, Dash (2005) indicates that the positivist paradigm is regarded by some as dehumanizing the human being, without their intention, individualism and freedom being taken into account in viewing and interpreting social reality. This paradigm usually focuses on numbers, statistical analysis and generalizability. Therefore the traditional quantitative approaches are not concerned with words, actions and records but with mathematical significance.

Guba and Lincoln (1994), on the other hand, argue that human behaviour, unlike that of physical objects, cannot be understood without reference to the meaning and purposes attached by human actors to their activities. Therefore another approach to research is also required. Qualitative research is concerned with social reality that is viewed and interpreted by the individual ideological positions. Therefore, knowledge is personally experienced rather than acquired or imposed from outside. The proponents of qualitative research believe that reality is multi-layered and complex, and single phenomena have multiple interpretations (Cohen, Manion, & Morrison, 2000). The qualitative data provide rich insight into human behaviour, and uncover emic views and theories; thus, for data to be valid they should be qualitatively grounded (Strauss & Corbin, 1998). The task of qualitative research is to discover patterns within those words and actions, through careful documentation and thoughtful analysis of the research data. It presents those patterns for others to inspect while at the same time staying as close to the construction of the world as the participants originally experienced it, and the aim is not to generalize the findings to the general population (Creswell, 2013).

Each of the paradigms has definite research methods which can be used in carrying out scientific investigations. Positivists emphasize an objectivist approach to studying social phenomena and give importance to research methods focusing on quantitative analysis,

surveys, experiments and the like. Naturalistic enquiry focuses on a subjectivist approach to a study of social phenomena and attaches importance to a range of research techniques. It focuses on qualitative analysis of data collected by means of personal interviews, participant observations, individuals' stories and personal constructs and document analysis (Creswell, 2013).

The researcher's choice of a qualitative approach for identifying the perceptions and experiences of participants in the first phase of this study was influenced by the characteristics of qualitative research as identified by Leedy and Ormond (2005: 97), Kumar (2005: 12) and Creswell (2007: 37). These characteristics, in summary, as applied in this research were as outlined below.

Firstly, the nature of the research inquiry and the aim of the first phase of the research was to do an in-depth exploration of the experiences of mental health providers and their interactions in processing mental health information. The focus was on understanding participants' experiences of the activities performed at individual, group and system level and how information is transferred and used between these groups. Secondly, the researcher wanted to present a detailed view of the subjects as experienced in their real environment. The researcher thus had to commit to extensive time in the field, trying to gain access and rapport for collecting data and to get an insider perspective.

Lapan, Quartaroli, and Riemer (2012) also argue that a qualitative researcher should take special note of how and to what extent unique relationships with the participants play a role in interactive investigation. In this regard, the researcher had previously worked in a mental health hospital as a psychiatric nurse for five years; however, that setting was different from the current research setting (district-based health facilities, primary health level). Also in terms of the time perspective, there had been no recent relationship with psychiatric services

to influence/bias the role and values of the researcher as a data collection instrument. Hence the researcher identified the research question pertaining to the naturalistic inquiry research paradigm and corresponding qualitative methodology as the appropriate research design to conduct the study.

As the aim of this study was to develop and validate a framework for MHISs, the design and development model of intervention research by Rothman and Thomas (1994) was selected to guide the research. The background and detail of this model and its application to this study are illustrated in the next section.

3.3 A summarized introduction to intervention research design and development

Intervention research can be regarded as a form of applied research developed from an earlier version of developmental research. Edwin J. Thomas was a pioneering scholar on developmental research, with an enlightened a way of developing innovative social technologies for social services, which he adopted from the field of engineering (Gilgun & Sands, 2012).

Rothman and Thomas (1994) identify three facets of intervention research: knowledge development; knowledge utilization; and intervention research: design and development. They outlined six phases of intervention research design and development: problem analysis and project planning; information gathering and synthesis; design; early development and pilot test; evaluation and advanced development; and dissemination. An important aim of Rothman and Thomas' intervention research: design and development, is to create a means to improve community life, health and well-being (Fawcett *et al.*, 1994). Furthermore, it examines how human services proceed from innovation to standard practice.

The roots of intervention research draw on the traditions of programme evaluation and the applied sciences, such as engineering, which solve problems using research knowledge. Fraser and Galinsky (2010) point out that intervention research partly arose from early evaluation casting doubt on the effectiveness of the social sciences. However, Du Preez and Roux (2008) argue that critical theory provides guidelines that could direct the intervention research as it involves more participative and reflective processes. Outside of the social work discipline, many others also have made significant contributions to the conceptualization of intervention research.

Rothman and Thomas (1994) were the first pioneers to propose an intervention research model in social work. They describe five related traditions that are useful in conducting intervention research: experimental social innovation, social research and development, developmental research, model development research and behavioural community research. Potential to expand the capability of intervention research includes substantive and methodological advancement. The three substantive advances involve the growing use of a risk factor perspective, the practice of relevant theoretical development, and increased acceptance of structural practice resources. The methodological advancement includes method of dealing with attrition, quasi-experimental designs for dealing with selection effects, and analytical methods for both text and numbers (Fraser, 2004).

Similarly, in identifying the potential contribution of intervention research in qualitative research, Nastasi and Schensul (2005) described the limitations of intervention research as lack of documentation of challenges encountered in implementing interventions designed to change or reform existing practice; and lack of attention to cultural and contextual factors which influence the validity of interventions. The majority of evidence-based interventions are developed from the existing body of knowledge, without the benefit of formative research and minimal attention to the specific needs and sources of the target population. The writers

suggest that to establish the validity and value of qualitative methods for conducting intervention research, particular attention should be given to the following points (inclusive of generative or formative or research to establish the need for intervention): it needs to define key constructs in a culturally valid manner; understand factors that influence the target outcome variable; identify pre-existing resources related to the intervention; document adaptations necessary for application to real-life contexts; and identify the core intervention component and unintended positive or negative outcomes for the individual and institutions/community (Nastasi & Schensul, 2005).

Fraser and Galinsky, (2010: 459) defined intervention research as “the systematic study of purposive change strategies characterized by both design and development determining explicit practice principles, goals and activities”. Gilgun and Sands (2010: 569) defined it as “research that involves the development and testing of practice models, descriptions of changes processes and the application of models of practice to new populations and context”. The latter formulate the definition based on their own experiences and on the pioneering work of Thomas and Rothman (1994) and other contemporary writers, such as Fraser and colleagues.

Fraser and Galinsky (2010) developed an outline, a five-step model for intervention research design and development: developing problem and programme theories; design programme materials and measures; confirm and refine programme components in efficacy test; test effectiveness in a variety of practice settings; and disseminate programme findings and materials. The intervention research design and development model developed by Thomas and Rothman has usually been used to develop interventions that address problems in social services, such as social work, mental health and public health.

In intervention research design and development there are recent advances that have the potential to expand its capability, which include three substantive methodological advancements: the growing use of a risk factor perspective, the practice-relevant theoretical development, and increased acceptance of structural practice resources.

Richey and Klein (2007), in their overview of the intervention research design and development model, acknowledge that in the process of design and development there is always an exploratory descriptive phase, using either a qualitative research approach, quantitative designs or a combination of the two.

For the purposes of this study the researcher chose the six steps of Rothman and Thomas' intervention research design and development model, with slight modification of the steps because phase 5 requires implementing the early developed model/framework and conducting evaluation and advanced development (see Table 3.1).

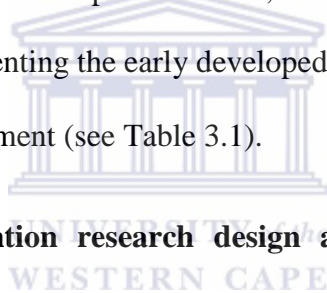


Table 3.1: Phases of intervention research design and development (Rothman & Thomas, 1994)

Phase	Operational steps
Phase 1: Problem analysis and project planning	Identify and involve client; Obtain permission and access to research settings; Gather information from study participants; Analyze identified problems; Set goals and objectives
Phase 2: Existing information gathering (objective 3)	Identify existing information sources; Identify functional elements of successful models
Phase 3: Design	Formulate an initial intervention model/observational design system; Specify procedural elements of the intervention
Phase 4: Early development and pilot testing	Develop a prototype or preliminary intervention; Conduct pilot testing; Apply the design criteria to the preliminary intervention concept
Phase 5: Evaluation and advanced development	Select an experimental design; Collect and analyze data; Replicate the intervention under field conditions and refine it
Phase 6: Dissemination	Prepare the findings for dissemination; Identify potential markets for the intervention; Create demand for the intervention; Encourage appropriate adaptation

Comer, Meier and Galinsky (2004) and Abell and Wolf (2003) indicate that in conducting intervention research it is not necessary to use all three facets (knowledge development; knowledge utilization, and design and development), or all phases of design and development (problem analysis and project planning, gathering information, design, early development and pilot testing, evaluation and dissemination). Therefore, for this PhD study the researcher applied the modified intervention research design and development model of Rothman and Thomas (1994), since it was impossible to complete all the phases within the time, scope and logistical constraints of this study. The study therefore combined the design and early development phase, then phase four became validation of the developed framework. The evaluation and advanced development phase in Rothman and Thomas' model (1994) is also beyond the scope of this PhD study, and therefore was not applied. The study therefore ends with phase five as described in Figure 3.1, which illustrates the application of the modified phases of the intervention research design and development model of Rothman and Thomas (1994) as applied in this study.

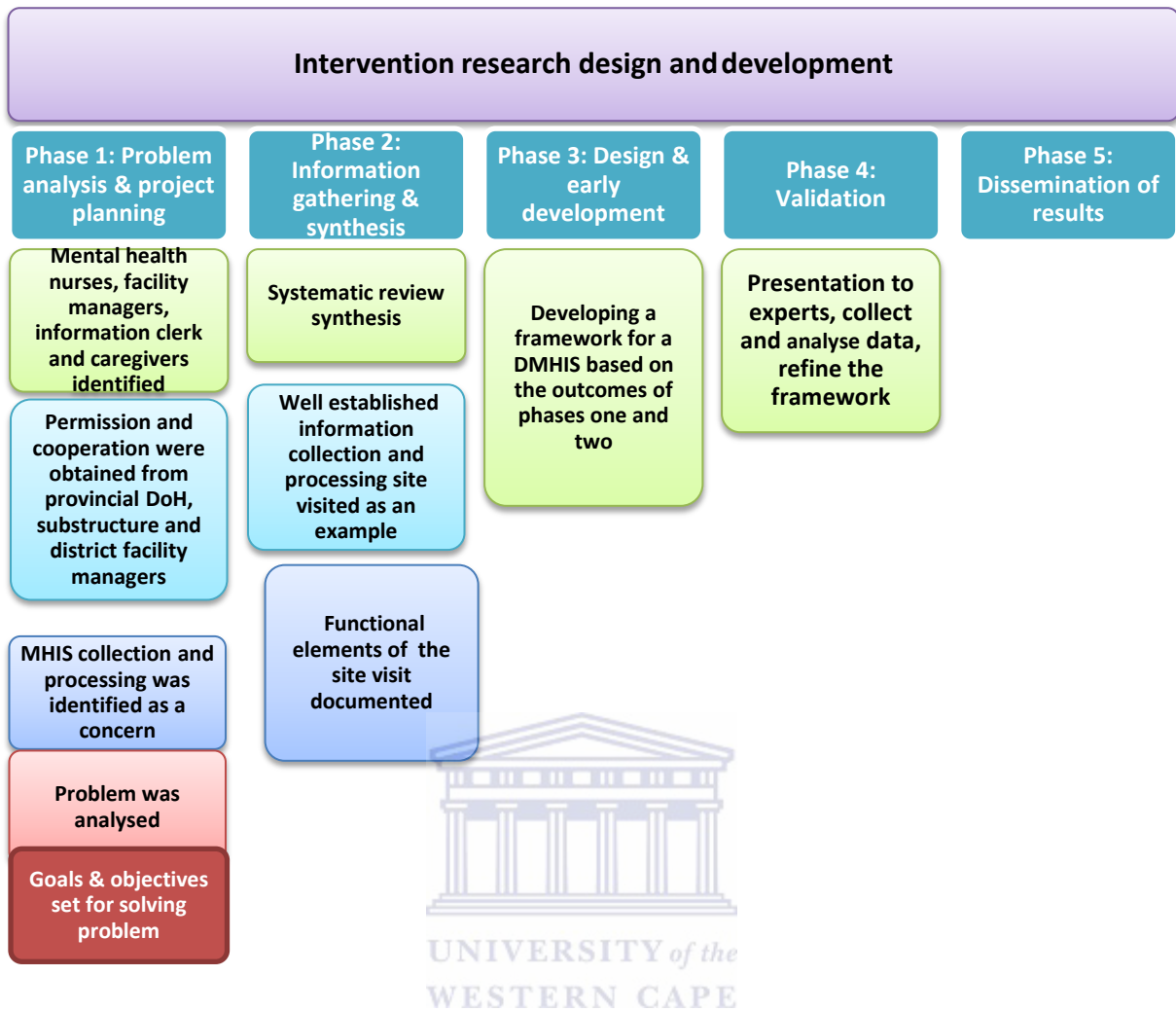


Figure 3.1: Intervention research design and development model of Rothman and Thomas (1994) as applied to this study

Figure 3.1 indicates that the first two phases of the intervention research design and development model (Rothman & Thomas, 1994) are problem identification and project planning, and gathering information and synthesis. Main activities in these phases were data collection, analysis, synthesis and interpretation of results. The design and early development of the prototype of the framework was based on the outcomes of phases one and two. In this study the design and early development phases (phase 3) were combined because they were interrelated. The last phase (the validation phase – phase 4) is the evaluation phase in Rothman and Thomas’ (1994) model. The importance part of this phase is the presentation of

the developed framework to a panel of experts to determine the suitability of implementation of the framework.

3.4 Phase one of intervention research design and development: Problem analysis and project planning

As indicated in Chapter one, there were three objectives that would be addressed in phase one of the study:

- Understanding the experiences of district-based mental healthcare providers, facility managers, information clerks and caregivers/stable persons with a mental condition, regarding management of mental health information at district healthcare level;
- Exploring information flow both ways at district-based health services; and
- Understanding challenges experienced at facility level during mental health information processing.

These objectives were realized by the implementation of the operational steps of the first phase of the intervention research design and development research process. As required by the first phase, the researcher engaged in the following operational steps: identifying and involving clients, gaining entry and cooperation from the settings, identifying concerns of the population, and analyzing the identified problems. The depth and the scope of qualitative study is largely determined by the purpose of the study, the nature of the research questions or objectives, and the resources available to the researcher (Maxwell, 1996; Ritchie & Lewis, 2003; Sandelowski, 1995). Qualitative exploratory research provides an in-depth window and insight into problems (Neuman, 2006; Bless & Higson-Smith, 2000; Denzin & Lincoln, 2000; Creswell, 1998; Sarantakos, 1993).

In the following sections the realization of the operational steps to identify the problem are discussed, starting with an orientation to the research setting.

3.4.1 Research setting

The study was conducted in the district of Cape Town in the Western Cape province of South Africa. The study focused on community mental health centres, where more than 85% of the population receive first health services. Previously the Cape Town Metropole had eight sub-district administrations; however, for administrative purposes these were merged into four sub-district administrations: Southern and Western; Klipfontein and Mitchells Plain; Northern and Tygerberg; and Khayelitsha and Eastern sub-districts.



Figure 3.2: Map of the geographical spread of the research sites

There are more than 40 community health centres (CHCs) and 17 mid-level clinics that provide mental health services in the four sub-districts. Of these, 21 community health facilities were used for the study.

For the FGDs the researcher selected three CHCs from the Eastern, Southern, and Western sub-districts. The three CHCs were selected for two reasons: firstly, each constituted a different racial group of people attending the mental health services; and secondly, it was impossible to include all sub-districts, such as Mitchells plain due to time constraints and capacity of the researcher, and Northern sub-district was not approved for this study's purposes.

In the next section the application of core steps identified by the intervention research design and development model is described.



3.4.2 Gaining entry/access to settings

Permission was granted from the provincial DoH to gain access to the settings; however, obtaining permission from the DoH was a lengthy and tedious process. It took more than 5 months to get some facilities' approval. Of the four administrative sub-districts, the Northern Tygerberg administration did not approve the application for accessing the health facilities for research purposes, because there were already too many research activities going on in the sub-district. The data collection exercise therefore covered three sub-districts and excluded Northern Tygerberg. However, since 75% of the research areas were covered and the results from the three sub-districts are similar, there is a high possibility that the results from Northern Tygerberg would also have been similar. Hence it is unlikely that missing the Northern Tygerberg sub-district affected the outcome of the research. Facility managers were

approached to identify participants to be recruited for the study. The following section elaborates on operational steps conducted.

3.4.3 Identifying the study population

Once access to the approved health facilities was granted, study participants were identified. The study participants were all situated in the research settings indicated in 3.4.2. Accordingly, for semi-structured interviews participants were mental health nurses, facility health managers, and information clerks/officers. For the purposes of this study the researcher used the term information clerk/officer interchangeably, because in some health facilities the clerk/receptionist also works as an information officer on top of their routine role, while other health facilities have already employed an information officer whose main job is to collect, process and report health information. At the time of the data collection process, all participants had had experience in their respective positions for more than 6 months. Participants for FGDs were identified with the assistance of the mental health nurse working in the facility; they were members of the mentally ill persons/caregivers or stable persons with mental conditions.

3.4.4 Sampling the study population

Choosing a study sample is an important step in any research project. The aim of qualitative sampling is not to draw a representative sample from the study population, but to provide illumination and understanding of the complex social issues that are most useful for answering humanistic ‘why?’ and ‘how?’ questions. Qualitative researchers recognize that some informants provide richer information than others and thus are likely to provide invaluable insight and understanding to the researcher (Green & Thorogood, 2004; Speziale & Carpenter, 2003). The purposive sampling technique is therefore common in social

sciences qualitative research, as it helps the researcher to select participants that can provide rich information. Bless and Higson-Smith (2000), Green and Thorogood (2004), and Speziale and Carpenter (2003) note that in purposeful sampling the informants should be selected on the basis of the knowledge they have about the subject of the study or based on the judgement of a researcher regarding the characteristics of the study population. Patton (1990) asserts that the goal of purposive sampling is to select cases that are information-rich to develop an understanding of the situation being studied. This can maximize the range and depth of specific information that can be obtained (Patton, 1990). The researcher actively selects the most productive sample to answer the research question; hence, the selection of participants was made using purposive sampling techniques.

Inclusion criteria were those participants that had worked in the study area for at least 6 months and were still working during the period of data collection. The participants were mental health nurses, facility managers and information clerks/officers.

Similarly, the inclusion criteria for selecting caregivers for the FGDs and individual interviews included being involved in caring for mentally ill family member(s), for example, family member(s), for the last 6 months, or those who had had mental conditions for more than 6 months but were in a stable condition during the data collection period.

Efforts were made to include participants from a range of clinical facilities in terms of the population group and facility type, from the three sub-districts, Southern and Western, Eastern and Khayelitsha, and Mitchells Plain and Klipfontein regions. Table 3.2 below reflects the profile of the participants.

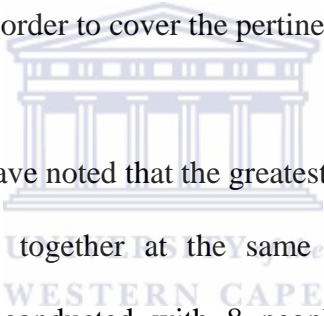
Table 3.2: Interview participants

	No.	Gender
Nurses	23	19 F, 4 M
Health managers	14	11 F, 3 M
Information clerks	14	9 F, 5 M
Caregivers for two FGDs	14	15 F, 3 M
Caregivers for individual interview	5	4 F, 1 M
Stable persons with mental conditions for individual interview	6	3 F, 3 M

About 57 CHCs and clinics provide mental health services in the Cape Town Metropole region. Fourteen (14) facility managers were recruited from 14 health facilities, based on their experience in the position. Similarly, 23 mental health nurses were recruited for interviews from 23 community mental health centres. Most of the mental health nurses had many years of experience working with mental health patients. A similar sampling strategy was followed to select 14 information clerk participants. Note that this position of information officer/clerk was created just a year before the data collection period, by the provincial DoH, to facilitate district health information management, that is, recording, compiling and reporting of events, to the highest level on a monthly basis. As a result, most of the information officers had less than a year's experience in the position, but some had more experience as clerk/receptionist in the same health facility or other similar ones.

The FGD participants in this study were caregivers of mentally ill people. Recruitment of participants for FGDs was assisted by the psychiatric nurses, who identified participants from the records and then communicated with them by telephone and made an appointment.

The family members/caregivers of mentally ill persons who gave consent to participate in the FGDs were recruited. It has been recommended that focus group research should constitute between 6-12 participants for FGDs (De Vos, Strydom, Fouche, & Delpont, 2002; Stewart & Shamdasani, 1990). The reason behind this is that when there are less than 6 participants in an FGD it is likely to be dull and less informative; also, more than 12 participants in an FGD are difficult to manage or moderate and may not offer enough opportunity for individuals with rich information to participate actively. Furthermore, the time required for the discussion may be extended unnecessarily in order to cover the pertinent issues at hand.



Stewart and Shamdasani (1990) have noted that the greatest obstacle in conducting an FGD is the need to bring 8–12 people together at the same place and same point in time. Consequently, two FGDs were conducted with 8 people in each group. However, the researcher experienced difficulties in bringing people together for the purposes of the FGDs; for example, on more than three occasions the participants did not show up without notifying of their absence. In one FGD there was a hiccup in that two participants decided to withdraw from the discussion. Even those who came to the FGDs did not show an interest in sharing their personal experiences with others. The researcher brought this issue to the attention of the supervisor, and the decision was made to conduct individual interviews with caregivers.

Based on the decision that was taken to conduct individual interviews with caregivers and stable persons with mental conditions, 11 participants were recruited for individual interviews to cover the remaining FGD part in the study. Although the researcher appreciates the

importance of issues that could have emerged from FGDs, individual interviews were ideal since participants seemed more relaxed and freely shared their personal experiences, which were insightful and informative.

3.4.5 Developing an interview guide

Interview guide questions were prepared to make sure that the relevant information was obtained from all participants. They were developed directly from the research questions that were the impetus for the research. The preliminary interview guide was developed through consultation with experts, and modifications were incorporated into the final interview guide after the pilot study. The purpose of an interview guide was to provide direction for the interview; hence designing a very good interview guide is most important (Mason, 2002).

Designing the interview guide followed the principles of a more general and structured nature to more specific questions. The interview guide questions allowed respondents to refer to virtually any aspect of the general stimulus identified in the question (Stewart & Shamdasani, 1990). Thus more significant questions were placed first and less significant questions near the end (although sometimes it is difficult to exercise judgement between which are more and less important). The interview guide included participants' experiences with regard to health information management (recording, processing and dissemination), characteristics/types, challenges and information pathways. In practice, most interview guides consist of fewer than 12 questions, although the moderator may frequently probe responses and add new questions as the actual interview progresses (Stewart & Shamdasani, 1990).

Similarly, for the semi-structured interview, seven interview guide questions were developed, and five interview guide questions were developed for the FGDs. In both cases, many

probing and clarification questions were used. The interview guide questions were in English and carefully worded so that the participants could easily understand.

3.4.6 Developing an instrument for document review

The researcher developed a checklist form to verify that all useful information was documented. The revised WHO assessment instrument (2005a) for mental health systems that provides essential information on what is required of MHIS of a country or region was adopted for use as a standard checklist. In this document review, electronic records were not included, because paper-based patient records were the main source of information recording in daily use at district-based health services. Patient folders were also not included in the document review, as the purpose was not to assess the quality of the care given to the patient. Bailey (1994) asserts that the reliability of document study may be checked either by looking at similar documents at two or more points in time (instrument reliability), or by comparing the results of two or more researchers at the same point in time (analysts' reliability). Content analysis was used for documents in the same way as for interview transcripts in qualitative research. Records/documents covering all mental health conditions were included in the document analysis.

3.4.7 Pilot testing

Pilot testing of the interview guide was conducted on a total of eight randomly selected individuals from the different groupings (who did not participate in the actual study). This helped the researcher to identify the misunderstandings or a biasing effect of different questions, and to determine if there were limitations or other weaknesses in the interview design (Turner, 2010). The pilot test also assisted in getting to know the scope of the research and the time it would take, as well as allowing the researcher to refine the research question, such

as adjusting the concept and wording and working out any procedural problems (Turner, 2010). Based on the result of the pilot testing, some of the wording were corrected for clarity and understanding.

3.4.8 Data collection process

During the data collection process the researcher was guided by five important questions, as follows:

- What are the experiences of mental health nurses, facility managers, information clerks and caregivers in the district MHIS?
- What does the existing information look like in terms of the collection process and utilization?
- What tools had been used to collect and process the data, what was the content of the data, and how was the process conducted, including information flow/networking?
- What infrastructure exists for a district MHIS?
- What are the challenges affecting a DMHIS?

The following data collection process was employed to collect data from study participants. The researcher explained to all the groups of participants about the HIS, the aim of the interview, and the information he wanted to gather. Most had a good understanding of the word ‘patient stat’ (statistical data) or ‘patient record’ instead of patient information, but they were less familiar with the words ‘patient information’ or ‘health information’. As a result, the researcher used the word patient stat or patient record during the interview sessions, so as to ensure that the participants had a clear understanding of what was being asked and answered the questions correctly. With FGDs and individual interviews with

caregivers/family members, the phrases information sharing, information about the illness, treatment/need to know more from the health providers about their own and family mental problems, and communications knowledge required to care for the person were used during the discussions.

3.4.9 Data collection methods

In this section, data collection methods and techniques are discussed. Data collection techniques were planned as part of the research design. The quality of data collection techniques defines the accuracy of research conclusions, and data collection procedures are equally critical (Brink, 2003). The researcher was well aware of the various data collection techniques, including their advantages and disadvantages (Brink, 2003). The following data collection techniques were selected as the most suitable and appropriate techniques for this study: semi-structured interviews, focus group interviews, and document reviews. A systematic review was conducted as the second phase of the study.

3.4.9.1 Semi-structured interviews

The key to a successful interview guide lies in explaining the aim of the interview to the participants and telling them what information the researcher wants to gather. Good practice in interviewing involves going back to the participants to verify whether the researcher understood what they shared with him and what they meant (member checking). Furthermore, the use of interim data analysis would help to determine whether data saturation has been achieved and to be good listener (Creswell, 2009).

In semi-structured interviews the participants are usually required to answer a set of predetermined questions. The purpose of semi-structured interviews is to obtain a detailed description of a participant's beliefs or perceptions about a particular topic (De Vos *et al.*, 2002). This method gives the researcher and the participants flexibility and allows for probing and clarification of answers or responses. Semi-structured interview schedules basically define the line of inquiry. The researcher should always be attentive to the response of the participants in order to identify new emerging issues applicable to the phenomenon under investigation (Maree, 2011). At the same time, it is easy to get side-tracked by trivial aspects that are not related to the study; in this case the researcher needs to guide the participants back to the focus of the interview (Maree, 2011).

In this study semi-structured interviews were useful in understanding how participants experience the MHIS at district community mental health services level. It is important to elicit the current practice of collecting and processing mental health information at district health service level, because it helps the researcher to gain insight into how the implementation of the DHIS helps them to understand the mental health problems in their community better and how to prepare to address the problems. The choice of semi-structured interviews as a data collection method for this study was based on the assumption that the participants' experiences about the DMHIS would provide more detailed and wider perspectives and understanding of the subject under investigation.

The main advantage of semi-structured interviews is that they may be used to elicit detailed and rich information on the phenomena being studied from experienced participants. This requires the use of open-ended questions and a skilled interviewer. The selection of the semi-structured interview data collection method for this study was based on the interest in exploring and describing participants' experiences regarding the topic of investigation using predetermined open-ended interview questions, where the interview was guided by the

schedule. This allowed the participants to share more closely in the direction of interviews, and the interview allowed the researcher to probe for more elaboration of issues throughout the discussions. In addition, the researcher was able to observe non-verbal expressions and body language and note down their possible meanings. In this relationship the participants can be considered as the experts on the subject, where they have maximum opportunity to tell their stories and the researcher able to follow up particularly interesting emerging issues that he/she had not thought of. This made the use of semi-structured interviews suitable in achieving the goal of this study (Creswell, 2007).

The major weakness of semi-structured interviews is that the quality of the information obtained is largely dependent on the researcher's skills in the interview (Patton, 1990). Thus poor interview skills, inadequate knowledge of the subject's culture, poorly worded interview questions and lack of familiarity with the project and context may compromise the quality and may also result in collecting little relevant information. In order to minimize the limitations of the semi-structured interview in this study the researcher obtained thorough training on interview skills; an expert was consulted for the wording of the interview questions, and more clarity was achieved through the use of pilot testing. Moreover, the involvement of the researcher throughout the project development and data collection process increased his familiarity with the project and its aim. The researcher also acquainted himself with the subjects, which helped him to gain more knowledge about their cultures and work environment.

3.4.9.1.1 Interview schedule for facility managers, mental health nurses and information clerks

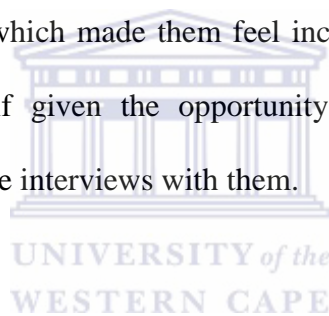
Most health facility managers who were involved in the study had a nursing background with experience in the profession, and all of them except one had more than 5 years' of

management experience. The facility managers' involvement in the district health management information system was basically through validating the monthly statistical report as well as allocation of tasks for information collection and conducting meetings with regard to information collection, processing and reporting. The facility managers are accountable for accurate and timely statistical reports. Fourteen health facility managers were interviewed, while four facility managers declined to participate. Making an appointment with the facility managers was not easy, as they were reportedly in meetings most of the time. Thus cancellation of interview appointments without notifying the researcher was common, which was tiring and time-wasting for the researcher. Some of the facility managers participating in the interviews had no interest in talking about mental health, because mental health is not their priority area in the district health service system.

A total of 23 mental health nurses from 21 health facilities were interviewed (see Appendix 2 for interview schedule). Most of the participants were female, and none had any training in the information management system. However, they were responsible for collecting patient information on a daily basis using different tools, such as register books and tally sheets. Nevertheless, most had rich experiences working with mental health issues at community mental health service level. Furthermore, the information which they usually collect is for case management and reporting purposes.

During the interviews, the nurses showed a great deal of interest in the discussions and in providing their stories with regard to the topic under investigation. Moreover, the researcher's full involvement in the data collection process as well as providing participants with briefings about the topic of discussions and aim of the study helped a great deal in obtaining valuable information. New themes stopped emerging (data saturation) after about 17 interviews had been conducted; an acceptable framework was constructed at 23 interviews, which was the stage of thematic and theoretical saturation.

Most of the 14 information clerks who participated in the interviews had less than 1 year and more than 6 months of experience working in the position of information officer (see Appendix 2 for interview schedule). One information officer who worked at a substructure office declined to participate after initially agreeing to do so, giving as the reason that he/she was too busy. The reason for this was that the DoH only started employing information clerks for the DHIS from November/December 2011. As pointed out above earlier, a few had previously worked as receptionists or archivists for many years before moving on to work as information clerks in the same health facility. However, none had prior training in IS or working experience in that field. However they received short training on the job about how to collect, collate and report health information in the health facility. Few of the information clerks were computer illiterate, which made them feel incompetent in their work; however, they were interested to learn if given the opportunity. This notwithstanding, valuable information was obtained from the interviews with them.



In this study the venue of the interview with the health providers (facility managers, mental health nurses and information clerks) was at their office, and the interviews were conducted during their working hours. However, the researcher experienced some inconveniences during interview sessions because of interruptions from other people, especially during the interviews with mental health nurses. Although an attempt was made to arrange the interviews after working hours to avoid such distractions, this proved difficult. Participants were not interested in giving up their own time for interviews, so all were conducted during working hours. The researcher felt concerned about taking time away from the patients.

During the interview process, the researcher first introduced himself and explained the purpose of the interview; he also explained that the interview would be recorded for the

purpose of capturing the information, and also explained about the anonymity of the information. The information sheet and consent forms were handed to the participants. After they had read them and understood the nature of the study and the implication of their participation, they were given time to ask any questions or obtain clarification about the study. Then they were asked to sign the consent form. After doing so, the researcher started to pose the questions one by one for the participant to respond. While the participants did most of the talking, the researcher did most of the listening to responses, and jotting down of notes.

The researcher started by asking the participants about their general experiences of the subject under investigation, for example “What are your experiences in collecting, processing and reporting mental health patient information at your health facility?”, and then gradually moved to specific questions, for example “How much of this information is being used at your health facility and for what purpose?” The next question was “What are the information flow structures within the facility, between health facilities and with higher health management level?” followed by “What are the challenges you experienced in collecting, processing and managing the patient information?” Opinion and suggestion questions were asked last.

The researcher was attentive to the responses from the participants in order to identify the new emerging lines of inquiry that were directly related to the phenomenon being studied, and further explored these through probes. When the participants diverted from the main topic of discussion to other aspects that were not related to the study, the researcher guided them back to the focus of the interview. However, the researcher allowed free expression of the participants’ feelings, without being judgemental or avoiding any leading questions or

arguments about whatever ideas they brought to the discussion, maintaining the discussion and taking the neutral researcher role. The researcher was able to observe the respondents' non-verbal communication, such as the facial expression and tone of voice.

In particular, the discussions with the mental health nurses got heated, and some of them became emotional and expressed disappointment because of the poor service provision and support system at the primary mental health care facilities. Such issues often diverted the participants' focus from the interview and issues under investigation. The interview sessions with the information clerks were filled with frustration and feelings of inferiority complex, as their job description and values were not understood by the clinical staff, and they felt that they were not welcomed and were undermined by the clinical staff. Such issues were carefully monitored by the researcher, and focus was brought back to the study.

The interview sessions with the facility managers were mostly cool; however, they expressed their frustrations due to inaccuracies of information that was collected and reported. The reports usually come back from substructure office to be corrected and sent back within a given time limit, but there is also lack of cooperation from the clinical staff. The facility managers were also frustrated in achieving the targets set for them by higher health management administration. The researcher read and re-read the field notes and listen to the tape to recall the interview context, and reactions as soon as the the interviews were completed, and tried to memorise some of the points missed out. This also helped the researcher to identify gaps to be explored in the next interview.

The focus of the interview was to explore a district mental health information management system, and this involved exploring how the information had been collected, recorded and

processed, as well as how it has been used at health facility level and disseminated to other levels, and what challenges they experienced. Key probing questions were repeated throughout the interview to achieve clarification. The question on their opinion/feelings was asked towards the end. The respondents were encouraged to take free rein and to explore more by using probing questions. The duration of the interview was between 40 minutes and 1 hour; all interviews were tape-recorded with the permission of participants.

Individual interviews with caregivers and stable persons with mental conditions were conducted, although these had not been planned originally. This was due to challenges which the researcher encountered in bringing together caregivers for FGDs. Despite taxi fare being provided by the researcher to support them with transport, they failed to appear more than three times for scheduled FGDs, and at the same time most preferred to talk individually rather than in a group. It was also assumed that language might be the barriers for participating in a group discussion, because some of the FGDs participants were not English first language speakers and might not have been able to express themselves. After discussing the problem with the researcher supervisor and co-supervisor the decision was made to conduct individual interviews with the remaining caregivers. Hence individual interviews were conducted with 11 caregivers. The interview questions were basically similar to those meant for the FGDs, modified to suit the individual interviews. The interview was tape-recorded with permission of the participants.

During these interview sessions, the researcher posed the interview question one by one. For example, “What is your experience in getting your mental health information needs from the health facility?” and “How adequate is the information needed to care for your family member(s) or to yourself?” This was followed by “Where do you usually get your mental health information needs met?” and “What are the challenges you experienced in getting

accurate and adequate information communication with the health facility?” Lastly, the opinion question was related to what they wanted to see happen in information management systems in the health facility in the future. Duration of these interviews was 35–50 minutes.

3.4.9.2 Focus Group Discussions

Among the widely used research methods in the Social Sciences is the FGDs. This research technique started after World War II and has become part of the social scientist’s research tools. The origin of the focus group interview was in the office of Radio Research at Columbia University in 1941, where it was started by Razarafield. Merton later adapted the techniques for use in individual interviews. Both in-group and individual interviews have become widely used (Stewart & Shamdasani, 1990). Since the time of Merton’s pioneering work, focus groups have become an important research tool in applied social sciences, such as programme evaluation, marketing, public policy, advertising and communications (Stewart & Shamdasani, 1990). The authors differentiated group in-depth interviews from other techniques by examining the meaning of the three words (group, depth and interview): a group is a number of interacting individuals with a common of interest; depth involves seeking information that is more profound than usually accessible at the level of interpersonal relationships; and interview implies the presence of a moderator who uses the group as a device for eliciting information.

3.4.9.2.1 Advantages of FGDs

Focus groups are primarily conducted for the collection of qualitative data, producing a very rich amount of data expressed in the respondents’ own words and context (De Vos *et al.*,

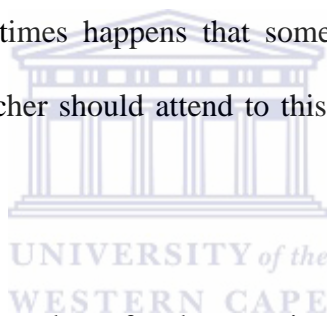
2002). Focus groups are much more quicker and at less cost-consuming than the individual interviewing process; and they allow the researcher to interact directly with respondents. The group dynamic can provide opportunities for clarification of responses, and provide useful information that individual data collection may not (Stewart & Shamdasani, 1990). They allow for follow-up questions and probing. Focus groups allow respondents to react to and build upon the responses of other group members (Stewart & Shamdasani, 1990). This synergistic effect of the group may result in production of data or ideas that might not have been uncovered in individual interviews. Focus groups are flexible, they can be used to examine a wide range of topics with a variety of individual and settings, and researchers and decision makers can readily understand the verbal responses of most respondents, unlike more sophisticated survey research that employs complex statistical analysis.



3.4.9.2.2 Weaknesses of FGDs

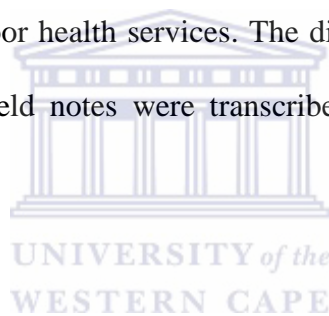
Even though FGDs are valuable research tools and provide a number of advantages, they also have weaknesses/disadvantages. The results cannot be generalized to a larger population; the responses from members of the group are not independent of one another, which restricts the generalizability of the results. Also, some people are uncomfortable talking in groups (Brink, 2003; De Vos *et al.*, 2002). The results obtained in a focus group may be biased due to very dominant participants or be side-tracked by a few individuals, while other participants may be hesitant to talk. The open-ended nature of responses obtained in focus groups often makes summarization and interpretation of results difficult. The moderator may bias results, knowingly or unknowingly providing cues about what types of responses and answers are desirable (Stewart & Shamdasani, 1990).

The essence of FGD offers mutual stimulation and encouragement and increases motivation to address critical issues, which leads towards the focal points and topical issues (Sarantakos, 1993). The interview venue for the first FGD was at a nursing office in the health facility, which was decided upon by both the participants and health facility staff, as the board room was booked for another meeting. The health facility was chosen for FGDs because it was a common place for all the participants as well as being easy to get to the venue. The second FGD session was conducted at a community hall, which was booked for the purpose. This venue was also close to the health facility and known to all participants. The duration of the FGDs was 1 to 1.5 hours each. Strauss and Corbin (1998) also note that although many researchers argue that FGDs produce data rich in detail which is difficult to achieve with other research methods, it sometimes happens that some participants experience them as threatening. Therefore the researcher should attend to this possibility and observe the focus group process carefully.



The FGD questions were similar to those for the caregivers and stable persons with mental conditions. Questions for discussion were raised one by one. Once a particular question was discussed exhaustively, the researcher proceeded quickly to the next. The FGD participants were asked to discuss one question related to sharing their experiences in getting their mental health information needs met by the health providers that could assist or empower them to care for their family members, and also one related to the adequacy and accuracy of information. This was followed by asking them about their main sources of information, and challenges they experienced in getting adequate information. At the end of the session an opinion question was posed.

At the beginning, a few participants tended to take the part of listening rather than actively involving themselves in the discussion. The researcher encouraged them to participate more actively by asking their views on the topic of discussion. At times the researcher allowed the discussion to rotate around the participants; in this case the dominant speaker was controlled and monitored well. Probing questions for more elaboration and clarification were posed for discussion. Some participants were emotional and filled with anger about the poor service delivery, the bad way in which they had been treated by some administrative staff members as well as clinical staff, and the current health service provision not responding to their needs. At times the discussion could be heated, and change direction more to the service delivery side. It was very difficult to keep them on the topic of discussion, because they were interested in talking about the poor health services. The discussions were tape-recorded and transcribed verbatim, and the field notes were transcribed as soon as the researcher had returned from the field.



3.4.9.3 Document review

Healthcare documentation has two parts: information capturing and report generation. Information capturing is the process of recording data either by using handwriting, typing, touch-screen or prints, or simply clicking on words (in the form of instructions), etc., whereas report generation is the construction of health care documents (paper or digital) through formatting and structuring captured information. It is the process of analysing, organizing and presenting recorded patient information and inclusion thereof in the patient's healthcare record (Waegemann *et al.*, 2002).

The purpose of the document analysis was to gain insight into the recording system, to examine trends, patterns and consistency of recording and processing of the information (such as the type of information usually recorded, what was overlooked or missed in

recording, storing and transferring the information) as well as the relevance of the information recorded. In this study the document review was conducted primarily to complement and strengthen the main research findings from interviews.

Some of the advantages of document review are that information contained in the document(s) is independently verifiable and that the process can be done independently, without needing to solicit extensive inputs from other sources. It is also typically less expensive than collecting data/ information on your own. It may also provide issues not noted by other means, and is a good source of background information. Last but not least, it is unobtrusive and provides information behind the scenes (Strydom & Delpont, 2005).

The disadvantages of document review include the fact that information on document(s) may represent a perspective that is not aligned with the objectives of the assessments. Furthermore, data/information in document sources may be inapplicable, disorganized, unavailable or out of date, or may not be exactly what you wanted. Moreover, collecting, reviewing and analysing many documents can be time-consuming and one may not be able to control the quality of data being collected; yet one must rely on the information provided in the document(s) to assess quality and usability of the sources (Strydom & Delpont, 2005).

Therefore, in order to reduce some of the flaws noted above, a systematic review process ensures that accurate information is collected during document review. Thus, identifying potential documents and developing a review protocol/checklist for the review of multiple documents enhanced the collection of valuable information and also minimized missing out documents for review.

Bailey (1994) states that the reliability of document study may be checked either by looking at similar documents at two or more points in time (instrument reliability) or by comparing

the results of two or more researchers at the same point in time. Similarly, documents from three community health facilities were compared and contrasted for credibility and reliability. The documents reviewed were 90 tallied sheets, 3 register books and 3 routine monthly reports (RMRs). Each of the documents was reviewed by ticking the checklist and writing notes about how or what patient information was being collected for reporting purposes and what type of information was recorded in the abovementioned different recording books or forms. Consistency and accuracy of the recording and reporting were also reviewed. The similarities of information forms and records between the three health facilities were also reviewed.

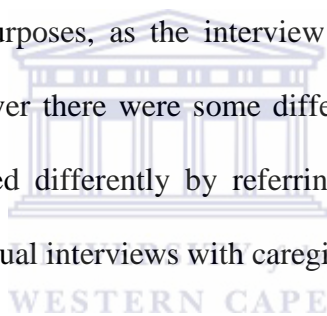
Storage problems were observed in all the three health facilities. Documents were piled up on the floor, on the tables and in a fragmented way. The problem of storage space was also expressed during the interview session with information clerks. Since document reviews are time-consuming, the researcher was thus limited to only three facilities. The purpose of the document review was to compare or complement the findings from the interview data.

3.4.10 Data analysis

Qualitative data analysis and interpretation is the process of assigning meaning to the collected information and determining the conclusions. It is conducted by organizing the data into common themes or categories. The data analysis and interpretation in this study followed the classification and description of the data analysis which included data reduction, categorization, and interpretation.

Qualitative data analysis is aimed at generating themes and making sense out of the data. In this regard content analysis was employed to analyse the data. Content analysis includes

counting how often certain words or themes occur, measuring information in the content as numbers and presenting them in tabular or graph form. Content analysis is used for exploratory or explanatory research, but most often in descriptive research (Neuman, 2003). The process of analysis consists of moving from the reading and memo-ing loop into describing, classifying and interpreting (Creswell, 2009). The tape-recorded data were transcribed verbatim, and then cleaned and prepared for the analysis. The huge volume of data had to be condensed and categorised to a manageable size. Meticulous readings were conducted to filter and clean the data. The interview data and field notes were coded with letters and numbers and grouped according to the participants. For example, the data from health providers (health managers, mental health nurses and information clerks) were grouped together for analysis purposes, as the interview questions for these groups were mostly similar. However, wherever there were some differences in the interview questions and responses, these were treated differently by referring to the group from which they originated. The FGDs and individual interviews with caregivers were analysed separately.



Since the interview was conducted for all groups in the English language translation of the transcribed text was not necessary. The transcribing and analysis were done concurrently with the data collection process. This enabled the researcher to identify gaps in the interview or if some relevant point was missing, so those gaps could be filled in the following interviews.

Creswell (2009) states that in analysing qualitative data, the researcher engages in the process of moving in analytic circles rather than using a fixed, linear approach. Dey (1993) notes that qualitative researchers “learn through practice” and qualitative data analysis requires them to develop insight and intuition and gain an impression. Similarly, the researcher in this study immersed himself in the details of the data in order to try to get a sense of the interview as a whole before breaking them into parts. In other words, by immersing himself the researcher

had developed insight about the whole sense of the data, learnt more about it and then drew an impression of the whole ideas of the data. First, the researcher read and reread all the information to obtain a sense of a general overview of all the transcribed information by jotting down notes and reflective notes in the margin of the text and/or highlighting text with different colours. Then the researcher started to look closely at the words used by participants in the study, such as the metaphors they used. At this stage the process of reducing the data had begun. Development of the themes was done by immersion in the data to understand and seek further explanation, and generating the theme. A code was assigned to individual text and line numbering was allocated to text, which enabled the researcher to trace back from which text the data was extracted.

In this study, data were analysed according to the objectives of the study rather than the interview questions. Analysing the FGDs with caregivers/family members and stable persons with mental conditions as well as individual interviews with caregivers/family members followed the same process as the first health providers' group analysis. The stable persons with mental conditions mentioned above had their own mental problems, but were well managed with treatment and functioning well. However, at the same time they also had a family member with a mental condition to care for. During interview sessions these participants discussed individual issues for their family members as well, and found that they had more experience on the issues under investigation. The narrative data analysis and interpretation followed the following three stages formulated for manual data analysis by Barry (1992), Creswell (2009), Leininger (1992) and Sarantakos (1993):

Stage 1 - data reduction: The information obtained from the participants was summarized and coded. The data were categorized according to similarities in order to integrate, transform and highlight the pertinent data. In order to achieve this, meticulous reading and transcribing

of the recorded materials, identification of the most important aspects of the issue in question and categorization of the materials were essential steps.

Stage 2 - data categorization: At this stage information was assembled around certain themes and subthemes. It was then categorized in more specific terms, and the results presented in the form of text and matrices. During category formulation the researcher develops themes or dimensions through some classification system and provides interpretation in light of his/her own views or perspectives in the literature. Detailed description means the researcher describes what he sees *in situ*, within the context of the setting of the person, place or event. Description is a good place to start with qualitative analysis after reading and managing the data, and it plays a central role in the analysis. Apart from looking at categories, themes or dimensions of information as a popular form of analysis, classification involves identifying five or six general themes (Creswell, 2009).

Stage 3 - interpretation: Interpretation involves making sense of the data. There are several forms of interpretation, such as hunches, insights and intuition. At this stage the researcher steps back and forms a larger meaning of what is going on in the situations or sites. Therefore, interpreting findings at different levels involves identifying patterns of consistencies and regularities, and making comparisons and discovering trends and explanations in order to make decisions and draw conclusions. In the final stages of the analysis the researcher presents what was found in text, tabular or figure form.

In the case of this study, the findings from different groups were relooked at to identify linkages between each other. Comparisons were made and such linkages are presented in the findings.

The documents were analysed using content analysis. First, a table was created with three columns and several rows. The relevant theme was highlighted. All the data obtained from

the document were entered into the raw data and the entire theme and subthemes were entered in the columns. Similar themes were identified and categorised under the central theme. The result was interpreted to identify the trends, pattern, and consistency in recording and processing of the information (see the themes extracted from document analysis in Chapter Four, section 4.7, Table 4.6).



3.5 Phase two: Information collection for design and development: Systematic review of a DMHIS

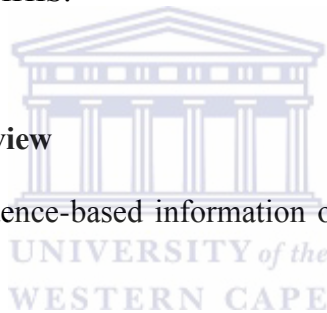
In phase two of the intervention research design and development, objective four of this study was addressed: to gather information on existing successful models/frameworks of MHIS and extract functional elements (Rothman & Thomas, 1994).

3.5.1 Aim of systematic review

The aim of the systematic review was to extract evidence-based successful functional elements for a framework of a DMHIS.

3.5.2 Objective of systematic review

The objective was to gather evidence-based information on existing successful frameworks for a DMHIS.



3.5.3 Systematic review questions

The main systematic review question was as follows:

1. What are the successful functional elements/models/frameworks for a district/community-based mental health information system?

Sub-review questions were:

1. What are the technical and organizational structures required for district/community mental health information infrastructures?

2. What are the information collection tools and content required for district/community mental health services?
3. What is the infrastructure required for collecting and processing mental health patient information?
4. What are the information competencies required for a district/community MHIS?

3.5.4 Type of studies

In identifying and selecting relevant existing information, Rothman and Thomas (1994) described nine potential sources: basic research, applied research, scientific technology, allied technology, national policy/regulations, indigenous innovation, current practice, and personal and professional experiences. Therefore, all relevant peer-reviewed and non-peer-reviewed papers, published and unpublished, were considered. Papers written about policies of MHIS and the framework for a HIS were also included. The types of study design included were those described in databases, organizational, governmental, and individual papers. The review also included conference/workshop papers, and organization- developed relevant frameworks/models.

3.5.5 Types of participants

Studies conducted to develop an MHIS or HIS framework policy/guidelines used the following participants: health providers at community-based health service, health information officers, experts on mental health/HIS, experts in planning and decision making of mental health services, researchers in information management systems and customers/clients. Papers from individual or group opinion papers from experts in the

abovementioned mental health information fields were included in the study. Furthermore, studies that were conducted on the use of frameworks for recording and processing patient information, on development of frameworks for managing a patient information system and reporting system and systems-based standard patient recording and processing system, were also included.

An outcome of interest related to the phenomena may be stated: the outcome of the systematic review was primarily successful functional elements for the development of a framework for a DMHIS; the secondary outcome of the review was general health information system guidelines or models.

3.5.6 Selection criteria

Inclusion/exclusion criteria for selection of studies included the process for critical appraisal, data extraction, data synthesis and presentation. All relevant published and unpublished articles in community MHIS frameworks and/or integrated community health system frameworks were included. Original articles published in English between 2003 and 2012 were included in the review. The researcher chose the time period of a year because it is considered an acceptable range to conduct a systematic review by most researchers.

3.5.7 Search methods for identification of studies

A systematic review was started by defining and developing the review key questions or words that specified the research question being addressed and the method that would be used to perform the review. All international sources of studies, reports and policy were considered, with particular emphasis on local context. Hand searches for reference lists of

pertinent reviews and studies, as well as abstracts from relevant conferences and organizations were consulted. Experts in the field were contacted as necessary during the process of systematic review. The electronic search strategies were gradually refined for each database as necessary. Bibliographic hand searching, conference proceedings as well as other databases, such as medical and nursing informatics, and computer model/frameworks for nursing information recording system were also consulted.

According to Rothman and Thomas (1994) the critical steps in this phase are gathering existing information sources and identifying functional elements of successful models as described. The information gathering and synthesis phase emphasizes the use of existing knowledge as the basis to develop a new framework. In this study the researcher adapted Okoli and Schabram's (2010) guidelines and the Joanna Briggs Institute's JBI-QARI and NOTARI (2008) critical appraisal criteria were used to conduct the systematic review and synthesis. Experienced librarians were consulted to assist in exploring current publications from the relevant databases or search strategies. Key words were used to search all relevant studies from 2003 to 2012. In the literature review (Chapter two) the researcher explored the theoretical underpinnings of information systems (why should there be an information system?) and this was used as the basis to identify publications on information management systems or published guidelines in both the developed and developing world that highlight frameworks/models or guidelines of HIS in general and district/ community mental health in particular. A summary of the retrieved documents, which included an elaboration of the theoretical perspective, conceptual framework, a description of the methodology and a statement of major findings were drawn up.

The systematic review was conducted using peer-reviewed articles that were retrieved using search engines on PUBMED, EMBASE, CINAHL, and Medline, JBI library systematic

review, PsychINFO and the Cochrane Library. The search was conducted in both Medline and PUBMED because the latter contains citations before they are indexed with MeSH and added to Medline. HIS frameworks and general journals were searched for articles not indexed in the databases. Databases were subsequently searched by the researcher to find any other appropriate articles not found through the database search. Many conferences, workshops, government policy/guideline documents, NGO documents, reports, texts, and health professionals' and social interest group websites provided relevant, non-peer-reviewed information about experiences. The last step was a general Internet search using the Google engine.

3.5.8 Data extraction and analysis

Data extraction in a systematic review is the process of sourcing or recording relevant results from original research studies. The data extraction template incorporated methodology, methods, types of participants, the method of data analysis used in primary studies and conclusions. The primary research, policy documents and opinion papers were determined by using the inclusion and exclusion criteria. The researcher as an independent reviewer reviewed and extracted the data from each study, while the supervisor acted as secondary reviewer and provided all necessary inputs during the data extraction stage. Systematically identified themes that emerged from the publications were recorded on a spreadsheets with a column for each of the key issues noticed.

3.6 Research rigour (validity of qualitative research)

Lincoln and Guba (1985b) cited in De Vos *et al.* (2002) presented a classic contribution to the methodology of qualitative research by developing criteria (standards) against which the trustworthiness of a project can be evaluated. The standards can be written in question form, with which all research must comply. Marshall and Rossman (2011) restated this in the following way: How credible are the particular findings of the study? How transferable and applicable are these findings to other settings or groups of problems? How can we be reasonably sure that the findings are reflective of the subject and the inquiry itself? Lincoln and Guba(1985b), cited in De Vos *et al.* (2002), refer to these questions as establishing the “truth value” of the study.



3.6.1 Establishing trustworthiness

In order to increase the validity of the qualitative research, Lincoln and Guba (1985) propose four alternative constructs that more accurately reflect the assumptions of the qualitative paradigm. Hence the trustworthiness of the study, its applicability, consistency and neutrality are ensured by credibility, transferability, dependability, and conformability.

3.6.1.1 Credibility

Credibility refers to internal validity, in which the aim is to demonstrate that the inquiry was conducted in such a manner as to ensure that subjects were accurately identified and described. Techniques used to achieve credibility include remaining in the field over a long period, using a variety of sources in obtaining data (triangulation), peer debriefing, and probing the researcher's bias, exploring meanings, and clarifying the basis of a particular

researcher's interpretation and conclusion (Brink, 2003). The strength of a qualitative study that aims to explore a problem or an in-depth description of settings, a process or a social group or pattern of interaction, will increase its validity (De Vos *et al.*, 2002). The researcher was engaged with the data collection process, and consulted with experts and knowledgeable persons in the field to increase the credibility of the study.

3.6.1.2 Transferability

Transferability which is taken as the alternative to external validity or generalizability, is defined as the extent to which the results of a study can be generalized to other settings. In a qualitative study, transferability or generalizability to other settings may be problematic (Brink, 2003). In this case, the researcher can refer back to the original theoretical framework to show how data collection and analysis will be guided by concepts and models. Data from different sources can enhance and strengthen the study's usefulness for other settings (De Vos *et al.*, 2002). Accordingly, data collection and analysis were guided by the concept and theoretical underpinnings, clarity and power of argument, fit between theory and method transparency. Methods and data representation and reflexivity were presented, and field notes and audio tapes were kept as evidence for interested researchers.

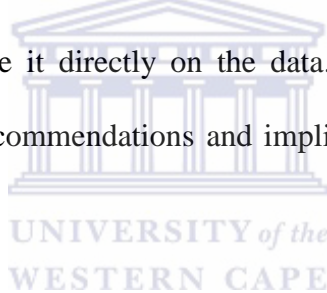
3.6.1.3 Dependability

Dependability is a criterion established by Lincoln and Guba 1985a to ensure trustworthiness of a study. It is the alternative to reliability, in which the researcher attempts to account for the changing conditions in the phenomenon chosen for study as well as changes in the design created by increasingly refined understanding of the settings. This requires that an audit be used, usually by a peer, to check the process and procedure used by the researcher in the

study and approve whether they are acceptable (Brink, 2003). This represents a set of assumptions very different from the concept of reliability of positivist notions, because the social world has always been constructed with the qualitative/interpretive assumption and the concept of replication is itself problematic (De Vos *et al.*, 2002). Therefore the researcher used more senior researchers and peers to check the process of data collection, consistencies in the process and data analysis techniques. Inputs from peers and senior researchers were very important to ensure dependability of the research.

3.6.1.4 Conformability

Lincoln and Guba (1985a) stress the need to ask whether the findings of a study could be confirmed by another. This can remove evaluation as an inherent characteristic of the researcher (objectivity) and place it directly on the data. Conformability ensures that the general findings, conclusions, recommendations and implications are supported by the data (Brink, 2003)

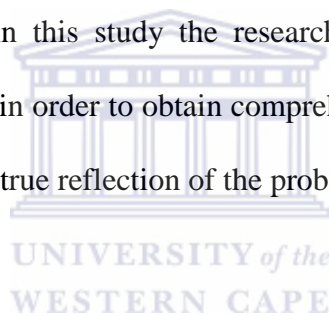


The data collection protocol was developed to keep an account of the data collection process and analysis and pilot tested to ensure clarity. The researcher gave the findings and the data to another researcher to confirm that the findings were supported by the data, and also given the results to the participants for member checking. This ensured that the findings were acceptable.

3.6.1.5 Triangulation

Researchers use several different types of sources that can provide insight about the same events or relationships. Neuman (2003) further elaborated on the concept of triangulation as the researcher measures the distance between objects from different positions by observing from different angles or viewpoints, which helps to get its true location. There are several

types of triangulation, but the most common is the use of triangulation measures, such as measuring the same phenomena in more than one way, which provides opportunities to see all the aspects of it. Jick (1983), cited in De Vos *et al.* (2002) discusses the advantages of using triangulation in qualitative research: (1) it allows researchers to be more confident of their results. It can also play a more constructive role and stimulate the creation of new ideas for capturing a problem to balance the conventional data collection method; (2) it may also help to uncover the off-quadrant dimension of a phenomenon. Moreover, results from multiple methods can lead to an enriched explanation of the research problem; (3) it can also lead to a synthesis or integration of theories through bringing diverse theories together on common problems. Thus it serves as a critical test, by virtue of its comprehensiveness for competing theories. Therefore, in this study the researcher used multiple data collection methods of the same phenomena in order to obtain comprehensive and rich information. This might have helped in providing a true reflection of the problem under investigation.



3.6.1.6 Member checking

Member checking is mainly used in a qualitative inquiry methodology and is a mechanism for quality control with the intention of improving the accuracy and credibility of the study (Barbour, 2001; Doyle, 2007). In a qualitative study the participants are usually involved in responding to a question directly related to their experiences. Member checking involves participants' verification of the analysis of the data and summary of the report (Roger, 2005), informant feedback, respondent validation, external validity and fittingness (Morse, Barrett, Mayan Olson & Spiers, 2002). Lincoln and Guba (1985a) believe that member checking occurs near the end of the research project, when the analysed data and report are given to the participants to review the authenticity of the work. In member checking the researcher would

restate or summarize information and then question the participants to determine the accuracy of the report. The participants either agree or disagree that the summary reflects their views, feelings and experiences (Creswell, 2007). The accuracy and completeness of the study are then affirmed by the participants, which ensures the credibility of the study. Member checking may also involve sharing of all of the findings with the participants and allowing them to critically analyse and comment on them (Creswell, 2007).

Although member checking serves to reduce errors in the interpretation of the data, with the overall goal of the findings that are authentic and original, member checking also has many drawbacks. For example, participants may change their mind about the issue, have new experiences, or forget what they said, and if they disagree with the researcher's interpretation, then whose interpretation should stand becomes an issue (Angen, 2000; Creswell, 2007).

The benefit of conducting member checking is to allow the researcher to verify the accuracy and completeness of the findings, which in turn helps improve the credibility of the study (Cohen & Crabtree, 2006). In this study member checking was conducted by taking the analysis of the data and summary of the findings back to the study participants for affirmation and validation of the findings. As stated earlier, member checking gives confidence to the study participants about the outcome of the study and also provide the researcher with an opportunity to correct errors and improve the credibility of the study.

During the process of member checking, some participants wanted to add more information that they forgot at the time of the interview; however, the intention of member checking was not to add new information, but to check if the information in the results was correct or not. Others disagreed that the information given by caregivers in the FGDs about the lack of a support system was true; they felt that the caregivers did not utilize the support system. The focus of most of the participants was on changes they wanted to see in the results of the

study. Due to time constraints and the difficulty of getting appointments with some participants, member checking was discussed with selected participants from each category of the study, and most agreed with the findings. Therefore the respondents' feedback established the validity of the study.

3.7 Ethical considerations

It is stated that the participants' privacy and dignity should be respected; therefore, their judgements and opinions remain strictly anonymous (Babbie, 2001; Hammersly & Atkinson, 1995). The research proposal was ethically approved by the Higher Degree Ethical Committee of the University of the Western Cape (see Appendix 4 for the ethical clearance). Ethical approval was granted by the responsible body to ensure that the whole research process maintained ethical standards.

Permission to use the health facilities for study purposes was granted by the authorities of the Western Cape DoH after scrutinizing the research proposal. A copy of the ethical approval and permission letter from the DoH (see Appendix 4) was provided to each facility manager for them to give the go ahead to use the facility (see Appendix 8). The researcher negotiated with each health facility manager on how to contact and arrange a convenient time to meet with the health personnel without interrupting normal activities.

An Information sheet was given to the health personnel and the purpose of the study and implications of participation were explained to them. All questions and doubts were clarified. The written consent form stipulated that information obtained from them was to be kept anonymous throughout the study and thereafter. The privacy and dignity of the participants

were respected, and their judgements and opinions remained strictly anonymous. Names and other identifiers were changed to protect the privacy of the participants.

Informed consent has been the cornerstone of most sets of ethical guidelines since the Nuremberg Code and Declaration of Helsinki, which stated that subjects must be volunteers and provide written informed consent. The consent of participants was voluntary and made with full understanding of the implications of participation. The participants were also informed that the information would be recorded by tape-recorder. They were told that recorded information would only be used for the purpose of the study and that presentation of the results of the findings would not contain any identifiers or names of participants. Participants were also assured that taking part in the study would have no negative effects on their jobs or to use of health facility. The participants were informed that there would be no gain or change in their status from participating in the study. They were also informed that the findings of the study would be shared and made available for them after the study.

The consent form was given to the participants and they were asked to indicate their willingness to participate in the study by signing the consent form. They were informed that they had the right to withdraw from participating in the study at any time. All participants signed the consent form; two withdrew from participating in the study without any prejudice, and other participants were recruited in their place.

The researcher's contact addresses were provided to the participants so that they could ask questions for further clarification where necessary. The consent form and information sheets were written in English because most people in the area speak and read English, and English was the only means of communication for the researcher to communicate with the participants. The researcher provided taxi fares for each of the participants who used a taxi to come to the venue for the interview or FGD.

3.8 Phase three: Design and development of the framework

Objective five of this study was developing a suitable framework for a district-based MHIS using phase three of the adapted intervention research design and development model of Strydom, Steyn and Strydom (2007). This involves synthesis of the findings of phase one and phase two. The researcher therefore pulled together and synthesized the findings in phase one and phase two which were conducted using Rothman and Thomas's (1994) intervention research model.

As mentioned earlier, intervention research design and development creates ways for improving community life, health and well-being (Fawcett *et al.*, 1994). The design is the method used to convert research findings into the social intervention. Rothman and Thomas (1994) define design as “a plan and systematic application of relevant scientific, technical and practical information to the creation and assembly of innovation appropriate in human service intervention”. For example, the information obtained in the analysis step is used to begin to plan and develop a detailed plan. In this way the process is systematic and produces specific learning objectives, and usually results in the prototype of the instructional project (Fraser, Richman, Galinsky, & Day, 2009). The design and early development phase includes the following activities: identify design problems; specify the boundaries of the domain of design and early development; generate, select and assemble solution alternatives; formulate initial framework; and initiate proceduralization (Rothman & Thomas, 1994). In this study the researcher identified five key problem areas from analysis of the empirical study in phase one and then in phase two identified five key successful functional elements from systematic review to address the identified problems in phase one. In this case a matrix table (Table 4.13) was used to describe how the systematic review findings of successful functional elements respond to each of the key findings in phase one. In the matrix table the vertical line

represents the key findings from phase one and the horizontal line from the top represents key findings from the systematic review. The points illustrated in each block in the matrix table address the key problem areas in the vertical. Then the key concepts, which are called successful functional elements (Rothman & Thomas, 1994) were used to design a framework for DMHIS.

In designing and developing the framework, the research findings from phases one and two were synthesized and converted from descriptive to a list of prescriptive statements and activities that are directives for applicability of the framework. The generation of alternatives and adaptable information is an important step in design and development of an intervention (Thomas & Rothman, 2013). Three criteria exist as conditions to be considered: completeness, compatibility and relatedness of adequate assembly of the variables (Thomas & Rothman, 2013). The boundaries of the domain of the framework were specified in order to determine the different interacting key elements. Proceduralization consists of provision of practice principles, practice guidelines and a list of recommended activities and instructions, a manual of operation or symbolically as a flowchart or network (Thomas & Rothman, 2013). In this study, following the formulation of an intervention framework proceduralization was set in motion through an orderly sequence of instructions, with the intention of making it easier for users to understand and make decisions, follow guidelines and carry out the desired objectives (see Chapter Four, section 4.10.2. for the procedural steps).

3.9 Phase four: Expert participants' review of the framework

In this study the researcher sought a review of the draft of the framework from external experts. These help to develop scientific rigour and enable the researcher to draw out and weave together everybody's recommendations (Black *et al.*, 1999; Ferguson, 1993; Goven, 2003; Stanfield, 2002). In this study, the review of the framework was conducted through involving external experts. The experts represented different disciplines: clinical area psychiatrists and psychiatric nurses; clinical psychiatric operational manager; academics in the psychiatric field, academics in IS design; an IT expert and mental health and rehabilitation managers from government. The first draft of the framework was sent to the expert participants through email and by hand. The reviewers were given the first draft of the framework, including the summary of findings, to help them understand the context which the framework addresses and its appropriateness in terms of design, and content, user-friendliness and viability. Within two weeks feedback was received from the expert participants by email and by physically collecting it.

Table 3.3: List of expert reviewers

Code	Expertise	Institution
R001	1 psychiatric nurse	District mental health services
R002	1 psychiatric nurse	Psychiatric hospital
R003	1 psychiatric nurse	Psychiatric hospital
R004	1 psychiatric nurse	District mental health service
R005	1 psychiatric nurse	District mental health service
R006	1 psychiatrist consultant and Head Psychiatry Hospital	Psychiatric hospital
R007	1 psychiatrist professor	University

R008	1 academic mental health	University
R009	1 M.Tech. IT (Technikon): Academic IT	University
R010	1 operational manager	Psychiatric hospital
R011	1 mental health and rehab manager	Provincial government
R012	1 academic informatics design	University

The reviewers reviewed the five key components areas of the framework: organizational support structure, information infrastructure, capacity building in HIS, community and stakeholders' participation, and quality data generation (inputs), process, and outputs. Under each of the key components, there were a list of prescriptive statements and activities. The expert participants reviewed the list of prescriptive statements under each of the key framework components using the reviewing instrument (see Appendix 6). All the relevant inputs were incorporated into the development of the second version of the framework.

The feedback in the first round was mainly focused on rearranging the statement according to the priorities, clarification of concepts to include decisive stakeholders, such as superintendents/chief executive officers, and emphasis on integration with PHC services and modification of headings. After the reviewers' inputs were incorporated in the second version of the draft framework, the second draft was presented to the mental health and IT panelists at a Health Information System conference in South Africa (HISA). The relevant feedback obtained from the panelists and conference audiences was used to refine the framework and develop the third version of it. Finally, the third version of the framework was sent to the experts for consensus agreement and further modification. This part of the consensus agreement replaced the workshop that could not be conducted due to difficulty in bringing together participants from different places. The final part of the framework development was

validated through experts' consensus agreement. A consensus agreement form was sent to expert consensus participants with the final draft of the framework. The expert participants had four options to choose from: (a) agree with the statement, (b) modify the statement, (c) abstain, and (d) delete/remove the statement. This process provided the opportunity for expert participants to decide on each statement of the framework. Thus, the essence of this agreement would ensure the suitability and applicability of the framework to the context of this study. The expert members were selected based on their experiences and expertise in the field and interest in it. The result of the validation of the framework is included in the results chapter.

3.10 Conclusion

This chapter began by explaining the choice and assumption of the research methodology and discussed the intervention research design and development model. The second section of the chapter discussed with the six steps of the intervention research design and development model; however, only the first four phases and phase six were used in this study. Phase 5 was omitted because it is beyond the scope of this study. Phase one comprises problem identification and analysis; phase two gathering information on functional elements; phase three designing and developing the framework based on the results from phase one and phase two; phase four validation of the framework; and phase five dissemination of the results.

The chapter also discussed the recruitment of study participants; semi-structured interview conducted with facility managers, mental health nurses, information clerks, caregivers and stable persons with mental conditions. Furthermore, it discussed in detail the FGDs conducted with caregivers and the document review. The third section of the chapter discussed the process and protocol of systematic review that was conducted in phase two of

this study. It addressed the rigour and trustworthiness of the study and, last but not least, the ethical considerations of the study.



CHAPTER FOUR

PRESENTATION OF THE FINDINGS

4.1 Introduction

This chapter presents the findings generated from interview analysis, document analysis and systematic review. The findings are presented in five sections. The first section presents the findings from the professional groups (health facility managers, mental health nurses and information clerks/officers). The second section presents the findings from the FGDs with caregivers; the third section presents the findings from individual interviews with the caregivers; while the fourth section presents the findings from document analysis. The last section presents the findings from the systematic review. The emerging themes are presented in tabular form and then followed by the narration of each theme. The main emphasis here was to obtain more detailed information based on the participants' experiences in MHIS at district health service level. The analysis was conducted based on the research questions of the study; this enables the researcher to group the results as per objectives, instead of analysing per each interview question.

4.2 Phase one: Experiences of mental health nurses, facility managers and information clerks in the DMHIS

The interview questions for the professional group participants were similar and were clustered together in reporting the findings. The findings were clustered into themes and sub-themes. In the event of different experiences that emerge from the analysis, the researcher

clearly indicated these in the discussion. Table 4.1 indicates the themes and sub-themes that emerged.

Table 4.1: Experiences of mental health nurses, facility managers and information clerks in the DMHIS

Themes	Sub-themes
4.2.1 Standards of health information collection tools and types of information content	4.2.1.1. Lack of standard information collection tools 4.2.1.2 Types of mental health information contents
4.2.2 Information processing	4.2.2.1 Poor quality of information processing 4.2.2.2 Lack of validation of information 4.2.2.3 Poor feedback system
4.2.3 Inadequate information competency	

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The discussion that follows is structured according to the themes and sub-themes indicated in the table.

4.2.1 Standards of mental health information collection tools and types of content

The standards of mental health information collection tools and contents are agreed upon ways to record patient data (Westra, Delaney, Konicek, & Keenan, 2008) and minimum data sets are concepts that provide the structure for aggregated data for comparison across practice (Westra *et al.*, 2008; WHO, 2005 b). Standards are one mechanism to ensure validity of data (Westra *et al.*, 2008). The information collection tools usually determine the type of content of information being collected; therefore the information collection tools and contents go together. However, for more clarity each of them are addressed separately under sub-theme.

In the current state of the DHIS, the mental health information collection tools and information content are not yet standardized for mental health information recording and reporting. The participants reported that there was no organized body that was responsible for mental health information collection and processing, both at provincial or national level. It was stated that although the mental health information was reported together with the integrated format of the DHIS, there was no adequate representation. There was only one mental health indicator being reported, i.e. “mental health visit”. This was based on a target-driven type of reporting, meaning that each facility was given a target to achieve in terms of the number of patients it must report on every month.

Two subthemes emerged from this main, namely standards of information collection tools and types of information content.



4.2.1.1 Lack of standard information collection tools

Information collection tools are standard tools that are agreed upon and designed to record health data required for use at national, provincial, district/local government and health facility level. Policy makers, healthcare administrators and clinicians require high-quality information for decision making and planning quality health services (Kass-Bartelmes & Rutherford, 2002). Moreover, standard tools can help administrators by providing information they can use for comparison and quality indicators to assess their own performance (Kass-Bartelmes & Rutherford, 2002). At district health facility level the information collection tools were mainly manual. The electronic information collection system was not available at the time of this data collection. The participants reported that there were no standard information collection tools for DMHIS. All patient information was recorded manually on patient folders, register books, personal diary books and tally sheets.

The information recorded on the patient folders was mainly used for case management. The register book is used to record patient socio-demographic characteristics, type of visit, follow-up appointment, folder number, and diagnosis (ICD10). The register book is frequently used to control patient movements and to check whether the patient misses an appointment or defaults on treatment; the information recorded in the register book is not used for reporting or other purposes. Although recording by population type, age, gender and disease profile is common practice, the recording has always been incomplete and inconsistent.

Tools used for collecting and reporting purposes were tally sheets, spreadsheets, and routine monthly reports (RMRs). However, a few facilities use Joint Integrated Management Initiative (JIMI) forms instead of the tally sheet to collect patient information for reporting. The daily tally sheet was designed to record the number of patient visits for each consultation. At the end of every week the daily tally sheets were transferred to a weekly tally sheet. At the end of each month, all collected information from each service point were collated by the information clerk/officer. The RMR form contains information requested by higher level only, such as the total number of mental health visits per month. The district mental health information reporting is also included in the RMR and there was no mental health reporting system to other mental health management/directorates at higher level. The RMR system was mainly used for statistical/administrative reporting rather than for quality of service provision – it was only concerned with the total number of patients seen per month. In other words, the monthly reporting tool does not include socio-demographic data, disease profile and quality of services. The RMR form was used by the substructure office to collect information from the district health facilities. Participants reported that the content of the RMR changes frequently, and that this made the work of the staff tedious as they had to

adjust to frequent changes in new tools introduced each time. These concerns were demonstrated in the data as follows:

“... you see whenever the tools changes ... today is this new tool, then national is coming down to provincial. We need to work on this, we need to get training on it and information session and then we must come back and prepare the staff and give them training on the new tools. Sometimes when you explain to them about the new tools they do understand it, but when it is time to do the job then they don't do it correctly. When you question them, then they say now we really don't understand why, how it should be used?” (Information officer)

Furthermore, studies conducted in South Africa have shown that there are complaints coming from health staff regarding the lack of proper management of data recording and the lack of an electronic recording system (Garrib *et al.*, 2008), especially without the help of a computer. This was confirmed in the researcher's study:

“Patient information recording is time-taking really. I think the computer can also do much better. The first thing is the folder is missing a lot. We struggle now to get the information. The folder is missing because they don't put it properly or they didn't put the right diagnosis, or treatment onto the patient summary letter. I think computer can help us. Patients also complain for waiting outside because we take time for recording; this is inconvenience. If we put information on the computer, it would be easier. We have a problem with communication with other facilities. The computer shows all facility/clinics, we can also liaise nicely with referral hospitals, because we don't have to ask the people always, if we can do it ourselves. People are always slow to respond to your request and you have to wait and wait for them” (Mental health nurse)

Some of the participants stated that they have to carry collected information home in order to transfer patient information onto the tally sheet, and this trend affected their life outside of work:

“We are doing everything manually at the moment. So we need to go the computerized method, the end thing nowadays ... so we need to skill our people with computer. So that all whatever we doing directly goes to the computer and where it can be accessed to the

multidisciplinary team, not just everybody, and there must be some kind of security codes”
(Information clerk)

Similarly, the mental health nurse supported the importance of moving to a computerized information collection system:

“The way forward is technology, computer, everything should be touch button. If a patient comes without a letter, I don’t know what treatment the patient is on and I cannot help the patient until I get the discharge referral summary letter. The tools we use are just the patient folder, that is the main tool we use. We don’t have a pen, I have to buy my own pen, and we do have the facility telephone to use when I need it. We don’t have a computer in our office, but we do have computers in our community health centre for admin work, but we don’t have access to those computers.” (Mental health nurse)

“Patient information is collected manually and recorded on the file, the computer is only for facility manager, register and pharmacy. The data collection instruments are spreadsheet with all indicators in it. It is paper-based. The monthly report is sent to the higher level by fax, reporting monthly to the higher level, but we don’t capture data by how many female, male or age category.” (Facility manager)

However, one facility manager had different views regarding the information management system and believed that a health information system is something for the developed world, because computers require resources and training:

“I think that would depend on what you need to do with the data. For me there are many ways we can improve it, but what do we do with the data? I am not sure about mental health, you talking about mental health information management system, is there something like that? It is First World country, there is no computer here. ... I told them this morning, some of them don’t have group wise address, even the doctors don’t have access to the computer. The one in the lab is out, I access it from here, so it is a little bit challenging, and I think all about resources, the necessary training and insight regarding the stats. ... Clinical staff doesn’t have a lot of respect for stats. If we respect our stats we got a lot of things right ... ”
(Facility manager)

However, the facility manager believed that there are certain things to do with the data by converting them into graphs so that the mental health nurse is able to interpret them. However, she also had doubts about collecting socio-demographic information on patients because she may not know what to do with these data, as there is no mental health program to address this. The following excerpt demonstrates this point:

“From the beginning of the year, the data will be converted to graph for her (mental health nurse) to see it and analyse it and ask questions such as what type of patient am I seeing more, and why am I seeing it more? Why is it? To break up by gender and age we specifically need to have a program for mental health you see, which will be ok. Also, the other thing is for her putting all this raw data, but we don’t know what to do with it. You see for me basically, I can look at it, she will be able to say but you know the previous month this was happening; why this increase or decrease? She doesn’t have a computer, she is not going to get a computer very soon. The clerk has got a computer, but he does paper-based because he doesn’t have the spreadsheet on the computer system, do you understand?” (Facility manager)

Participants experienced a lack of standardized recording tools for mental health information. Mental health is integrated at the PHC level; therefore, they use the same RMR for mental health as well. The recent RMR contains one column designated for mental health information reporting, i.e. total mental health visits per month. The frequent changes of information collection tools and the burden of workload created inconveniences the health workers and information clerks/officers required to collect and process the information.

Studies elsewhere have shown that electronic recording systems are advantageous in terms of collecting accurate and complete information, communicating with up-to-date information, reducing redundancy and nurses’ satisfaction (Gans, Kravelski, Hammons & Dowd, 2005; Miller, West, Brown, Sim & Ganchoff, 2005). However, there was no similar study conducted in this area to link the quality of electronic recording and health system improvement. It was highlighted that the electronic recording and reporting system should simplify the workload and improve the quality of information collection and processing. In

general, the effective implementation of electronic information recording and networking could save costs by improving healthcare efficiency and safety, and health IT enables prevention and management of diseases and provision of high-quality care in the complex healthcare system (Gans *et al.*, 2005; Hillestad *et al.*, 2005).

The findings of the study show that there seems to be a lack of properly designed mental health information collection tools to collect information required to meet the minimum data set for district mental health services, and that there was no responsible body to coordinate the MHIS at national and provincial levels.

4.2.1.2 Types of information content

Information content is the type of information required to be collected and reported for the decision-making process and planning of mental health services. The participants reported that the substructure office only required information on the number of mental health client visits, new mental health clients, chronic mental health patient visits, mental health patients referred to second-level or tertiary level hospitals. The stat form (RMR) used at the health facility comes from the substructure office, and the same one is used across the CHCs. The RMR is revised frequently, and in some health facilities they used both the old and new stat form. The new stat form is usually meant to reduce the amount of information being collected, since no one is using it at higher level. It was stated in the DHIS policy 2011 that there was a problem in managing the information at national level due to lack of skilled personnel (DoH, 2011).

The following statements highlight the experiences of mental health nurses in recording patient information:

“We use the mental health register book to write age, gender, diagnosis and date the patient come to the health facility. Every year we rewrite onto the new register book (transfer the information into the new register book). We don’t use this information. The sister who worked here before me didn’t have a mental health register book.” (Mental health nurse)

“I have a register book where I write personal information such as age, gender, folder number, ICD10, new/chronic patient. I have my own dairy book where I write some information about the patient I see. I have doctor’s appointment book and the stat form. At the end of the month we do the stat report, but not data from the register book. There is a stat form for reporting purposes. The stat form has information about the head count, such as new mental health visit, chronic mental health visit, patient referred to either secondary level or tertiary level.” (Mental health nurse)

The majority of participants pointed out that it was too time-consuming to record all the information on different forms and register books. They believed that transforming the manual recording and reporting system to an electronic recording system could solve the current information processing problems as well as that of missing of patient information:

“...what we want is the total amount of patients for mental health, how many new patients they have for the month. One is mental health visit, mental health new, patient referred to second- and third-level hospitals. Previously there were 8 elements on the RMR for mental health reporting, then there were 6 elements on the RMR and then it was reduced to 4 elements. Currently the 4 mentioned elements are also being reduced to only one element, that is the total number of patient visits per month. This form is updated frequently; it was updated at the beginning of the year, I think it was updated from June. Some elements have been taken away.” (Information clerk)

“Personally I feel that it is necessary to record and report information on gender and age, children to be collected and reported. Just to see how community itself or if males or females are more affected with mental health problems, as well as children. by giving us that number, we can also pick up and try to see ok it seems to be a lot of male patients, then back track and find out why it is so or is it domestic issues, is it hereditary ... personally I feel it is important that those statistics people do it as well, but there has been an absence of it since I started.” (Mental health nurse).

The need for an improved routine HIS is well documented, while there was consensus that the HIS should be restructured (Sandiford, Annett & Cibulski, 1992; Lippeveld, Foltz & Mahouri, 1992). The role of the HIS is to generate, analyse and disseminate sound information for public decision making. It is part of the healthcare system. At the beginning of the data collection for this study the mental health information required at national level was the total amount of patient visits per month to a health facility; this included the number of new patients seen, the number of chronic patients seen, the number of patients transferred in and transferred out, and patients devolved to PHC level care. However, towards the end of the data collection exercise for this study elements used for recording and reporting were reduced to only one element – the total number of mental health visits per month.

The WHO MHIS provides guidelines for mental health information collection and reporting which includes: routine service reporting, special programme reporting, administrative system, and vital registration system (WHO, 2005b). The principle is to start with small elements accompanied by a gradual increase – but not the other way round. However, when it comes to mental health information collection and reporting, this is not the case in South Africa. There RMR tool is used to complete and report the total number of mental health visits per month. The focus is on the amount of patients seen rather than the type of population affected or characteristics of patients and disease profiles or quality of care provided.

The following quotes illustrate this point:

“Basically the mental health head count done on a monthly basis is the amount of new patient visits, patients referred to second- or third-level health institutions. ... the head count is to assess the load of the mental health patients, and this obviously contributes to our head count. Basically that is workload assessment. That is what we at facility use it for. At a higher

level I think also collectively look ... to open more mental health care, so obviously stats collected would speak to them.” (Facility manager)

However, as stated earlier, before the completion of the data collection period of this study the abovementioned mental health information contents for reporting were reduced to just one element: the total number of mental health visits per month. It was observed that although some nurses responded that the reduction of reporting to one element seems to reduce the workload in recording the information, it brought with it more concerns, as it was seen to be inadequate in informing decision making or policy making for mental health services. Moreover, the current headcount reporting does not reflect what they are doing in terms of service delivery. The following quote from the data consolidates this:

“There is nothing really at national level, so I don’t think there is a sort of information at national because everything we look for – mental health data, the research report - there is no statistical information on this particular condition, which really makes it difficult for researchers and policy makers to make a decision because there is no tangible information. I think there is a struggle there in terms of policies, all of that we always complain that mental health is not a public priority, but how can we make it a priority if nothing really informs the problem” (Mental health nurse)

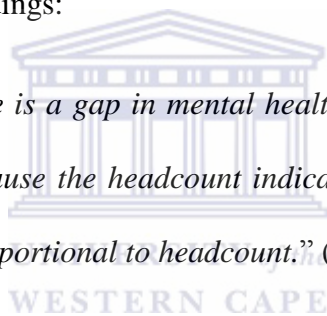
“The issue mentioned earlier is critical – what types of patient arrive at our doorstep, what are we doing? What is my link between my facility and the community-based services? I need to filter down the information to that level. I haven’t thought about this recording by age and gender; yes, it is important in terms of epidemiological study. I don’t think we even do it for the big ones, but it is something we need to think about.” (Facility manager)

“It is important to know by age or gender if you are looking for that, but the information required is set out for us by the substructure. Recording by age and gender categories is very important, it gives a clear idea why more female affected, why children are affected, it gives a clear reflection on circumstances. We discovered that a lot of young people are becoming mentally ill due to increases drug use, and a lot of mentally ill people need a Disability Grant. I don’t know, there has not been much focus on mental health towards improvement. A lot of things are important, anyhow you don’t report because problems with mental health

don't tie in with MDGs. I can tell you straight now there is not much emphasis on mental health, mental health doesn't rate high, basically mental health services are in isolation."
(Facility manager)

While the MHIS guidelines have shown that the socio-demographic characteristics of patients, geographical areas, diagnosis, disease profile and quality of care provided are mostly included in monthly or quarterly reports (WHO, 2005b), this is not so for South Africa. According to the responses obtained from participants, the purpose of the headcount reporting system is to measure health facility activities against the target, to assess the service rendering and make plans, to open more facilities and to determine the allocation of resources, to assess the workload, request extra resources or determine budget allocation. The following quotes reiterate the findings:

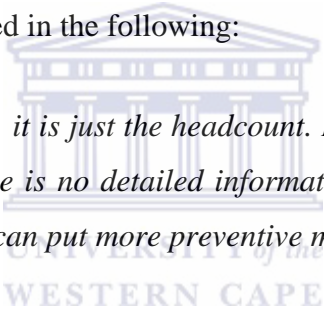
"Now so they are realizing there is a gap in mental health and maybe that is why they are interested in the headcount, because the headcount indicates how much money that facility needs, so budget allocation is proportional to headcount." (Facility manager)



The findings inferred that reporting of the number of visits per month does not give the actual figure of mental health patients in a particular health clinic, because the same patient could have been counted more than once in a month as some patients may visit the clinic every week, or every two or three weeks. In this case, this particular patient can be counted and reported as a different patient more than twice. It was observed that in other clinics it was counted and reported as one patient even if the patient arrived at the clinic more than once per month. This could be attributed to a lack of standard guidelines for health providers on how to report patient information, and that the national health information policy is too general in terms of what to report and how to report patient information.

The national HIS policy paper recommends that information systems consist of information on demographic data, socio-economic status, health status, health resources, healthcare

provision, healthcare utilization, health promotion as well as healthcare coverage (DoH, 2011). However, in reality this was not practiced at district mental health service provision. Reporting requirements of the data were set at national level and sent to the provinces for implementation. The policy allows for the provincial DoH to include more information as they wish for their own use, and to send it to the district health service point. Ideally the national HIS should receive information to respond to the abovementioned data set and integrate data from various sources of healthcare services into useful information for decision makers. As mentioned earlier, the MHIS framework embraces a range of different systems and subsystems. However, the findings of this study seem to suggest that the mental health information reporting system is in practice not in line with what is contained in the WHO MHIS guidelines. This is illustrated in the following:



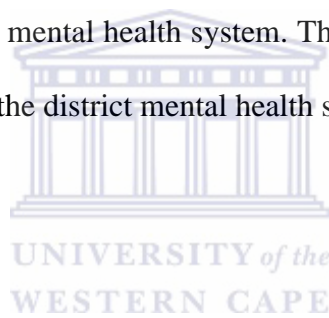
“There is no detailed information, it is just the headcount. If they may do a study, you cannot plan for prevention, because there is no detailed information for the affected population. If they can study by age group they can put more preventive measures in place.” (Mental health nurse)

The data substantiate the findings. The following is a statement from another mental health nurse:

“I looked at each service department, for example Maternity Obstetric Unit, I identified a lot of areas that there was no recording, which varies to me knowing the mortality of children and mothers and addressing that type of thing. However the statistics they ask to report is not telling us what the current situation is.” (Mental health nurse)

The study revealed that the majority of the participants realised the importance of including the socio-demographic data and disease profile in the monthly report, because it provides insight to the decision makers about the mental health circumstances or problems in the area. Some of the health professionals also believed that this study enlightened them about the importance of recording and reporting patient characteristics and disease profile.

To summarise this section, the current mental health information reporting is inadequate for decision making and planning of mental health services, but may be of help to the higher officers in determining the load of mental health patients in each health facility. It should be pointed out that the most important parts of the information critical for decision making and mental health service design, such as the quality of services and socio-demographic and disease profile, are not reported. This could affect the decision-making process and the outcomes of mental health provision in the country. Headcount reporting is target-driven and used for resource allocation to the health facility, based on the total number of patient visits per month per health facility. The findings further support that reporting should be more detailed to provide a view of mental health problems in the area which could assist effective decision making and improve the mental health system. This is one of the areas that needs to be addressed in order to improve the district mental health services.



4.2.2 Information processing

Information processing is the movement of health-related data/information from where it has been collected to the end point where it is utilized. It is the process of collecting, collating, transmission, analysis, dissemination and utilization of the information. The participants reported that they have concerns about the problem of processing mental health information. At district health service level, mental health information is recorded by professional nurses who are providing mental health care. Sometimes a psychiatrist consultant may take a full patient history. Three subthemes emerged under the main theme of information processing: quality of information, information validation/verification, and feedback in information processing.

4.2.2.1 Quality of information processing

The quality of information processing refers to the completeness, relevance, consistency, accuracy and timelines (WHO, 2004b, 2008). Data can be considered complete from a theoretical perspective, but it is not always checked whether the data actually and completely reflect the patient situation. This highlights how perspective, completeness and correctness are necessary for data accuracy. The literature review identified that health records, both manual and electronic, refer to completeness and accuracy; however, knowledge about the accuracy of such health data is limited, and only a few studies have been conducted on the accuracy of nursing records (Ehrenberg Ehnfors,& Smedby 2001). On the contrary, the focus of many researchers is on the data entry but not on the causes of inaccuracies in the data, a relevant aspect of computerized patient records which is supposed to enhance clinical decision making and reduce errors in healthcare services.

The findings of this study identified that participants' perceptions were that there were inaccuracies in capturing and processing patient information in district mental health services. Most participants stated that collecting poor-quality or inaccurate information has a negative impact on service delivery. It affects planning and budgeting, taking preventive measures and getting a clear picture of what is happening in the services.

The health facility managers have major concerns about the knowledge and skills of information clerks with regard to accuracy of information collection and collation:

"I have a big, big problem with data capturing, there are always inaccuracies in the data"

(Facility manager)

At clinical level the inaccurate recording of information affects patient diagnosis and treatment. The participants believe that the way in which the information is collected and

processed has an impact on patient treatment outcomes. The views of participants were that although information informs you about the current situation and future vision, and assists you in planning and adjusting service provision, unfortunately this is hampered by inaccurate information. The following quote summarises this view:

“If the data is not translated or don’t draw meaning out of the data, it is just useless.”
(Facility manager)

Participants stressed that particularly for mental health planning and community outreach, one needs to know how many patients there are. It is therefore necessary that relevant staff should understand how important information collection is, as well as grasping that working and reworking the data have meaning. This view is summarised as follows by a facility manager:

“Properly collected data give you a lot of meaning, a lot of motivation, a lot of reason why this thing needs to be improved, what is the gap, what is the shortcoming.”

A few participants indicated that inaccurate information capturing cannot affect service delivery directly, but it can affect the preventive aspects:

“I don’t think it affects the outcome of care, because we are under obligation to provide quality care. However, it does influence the awareness of mental health, it does affect to know how big the problem is.” (Facility manager)

Another participant stated that: *“... it is not the data collection process that influences the outcome of the services, because the data collection process doesn’t make the client seek mental health services.”* (Mental health nurse)

Other mental health nurses perceived that the inaccurate information recording and processing has an impact on how they respond to the mental health problems:

“... due to lack of accurate recording and processing information about mental health users, it does have an impact on how we respond to the mental health problems, such as the big problem of relapse in the Western Cape.” (Mental health nurse)

“Because if you don’t do it correctly I will not get staff, if you complain, you will not get resources, because your stat is not really what you are doing, so those are the most reasons. The director will say - no you have enough staff, you don’t need staff. I won’t give more staff, because according to your stat you don’t need more staff or resources, because you didn’t reach target. We are trying to reach our targets but there are challenges, there are barriers regarding this, but we will overcome this only when you do quality of care and your patient benefits ... then I will get job satisfaction. It doesn’t matter if I reach the target, if I get my job satisfaction with this client then I know I have done a lot you see, OK.” (Facility manager)

The majority of the participants stated that it is important to accurately record information in order to help determine the escalation/increase in patient load, the increase in the specific category of mental health cases, and also to see whether a crisis has increased in a particular diagnosis, such as drug abuse. It also helps one to be more aware about certain cases and concentrate more on them.

However, they pointed out their concern and challenges with regard to collecting accurate patient information and processing. They noted that it is important to address these challenges, particularly with health workers. The following quote indicates this:

“... the big problem lies specifically with clinicians; sometimes they have attitudes of why me, this is not my job, and they don’t want to take it as part of their job?” (Information clerk)

Other participants pointed to the reasons for inaccurate recordings, as indicated in the following quotes:

“The reason for inaccuracy of information, because people don’t realize the importance of accurate information and lack of training may be one part of the reason as well. We coming from the history or background of you know people let it go ... if they didn’t do it, it is OK, if they do it, it is all OK, it is not the issue.” (Facility manager)

“Sometimes it may be difficult - processing information, it is also hectic somedays for you and there is forever interruption. You can’t really get to your processing depending on your day, how your day goes ... sometimes it is overwhelming, but we are trying ... there is a computer there, we are not there yet to use it, to put the information onto the computer.”
(Mental health nurse)

In summary, this study identified that there is a major gap in the quality of information processing at district mental health services. Several reasons were mentioned for the poor quality of information processing, including lack of training and attitudes of the clinicians. The perceptions of how accurate information impacts on service varied among the participants, but most agree that it has an impact on the decision-making process and in policy formulation, knowing how big the mental health problem is, and taking preventive measures and raising awareness of mental health. It seems that the current information collection does not show a true reflection of what is happening in health services. There was a strong common understanding and views that the quality of information recording and processing influenced how to respond to mental health needs such as increases in relapses and drug abuse crises in the community.

4.2.2.2 Validation of information

An information audit was considered one of the most important tools in information processing with regard to the identification, costing, development and rationalization of information resources and information services, which are particularly important for decision making (Dubois, 1995). The information audit process has the following phases: planning;

survey of resources, flows and needs; blueprint of the situation; report with recommendations and actions, and establishing regular monitoring mechanisms (Stanat (1990), cited in Dubois (1995). However, at the time of data collection for this study, there was no information audit system at the DHIS, but rather there was a practice of validation of the data. The participants highlighted that there were challenges with the collection and processing of information, because it was always inaccurate and inconsistent. Some pointed out that in some cases, they found that patient information was written on a piece of paper every day, which sometimes got lost before being recorded.

The monthly stats collected are verified by the facility manager for gross differences from the target that was set; reasons are provided about the discrepancies before they are sent to the higher level. The following findings from the data demonstrate the validation process in the district health system:

“My role is validating the stats with the team, who collect and collate the information [information officer] to look at, if the stat is lower or higher give justification, but validation is superficial I would say.” (Facility manager)

“I scrutinize the stat before it is sent to the head office, because of the operational plan we need to meet – are we on target, or below target.” (Facility manager)

“... the very first tools are collection data sheets, that is the first thing, then information collation in the management department, checked by me, verified and looked at to see that everything is correct, then sent up to higher substructure.” (Facility manager)

The techniques of how the validation is being conducted were substantiated by different facility managers, mental health nurses and information clerks as follows:

“... then they enter data on a monthly basis together to validate if it is correct or incorrect, and you get the previous month as well as the month before, you look at it at one current month and the month before, and now you take the third month and see how I am doing in terms of collecting the stat and are new clients increasing or decreasing.” (Information clerk)

“Sometimes for example your mental health visits for this month 1x404 and this month if there is still new patient activity 1x400 + 20 new patients recorded, but now it is less than what it was. It means there is an error somewhere. You know that it is not recorded/misrecorded or miscalculated ...” (Mental health nurse)

However, some facility managers had different views about information processing – that it cannot affect the outcomes of mental health services, as reflected in the following statement:

“Like I said, it is not the way we collect and process the information that determines the outcomes of the patients, there are other factors such as social conditions that affect the outcomes” (Facility manager)

“I don’t think they fully grasp the importance of stats that is what we have. We had an audit recently on the information management, there we discussed the staff, they don’t understand the importance of information, because the stat is the foundation of planning for whole services. So when they are busy you find that the doctors especially don’t do the proper ticking, so at the end of the month you get plain sheets, and now you have to draw folders to see what the patient came for. It also adds stress on other areas, other departments in the facility. So yes there are barriers; incorrect or the failure to keep stat.” (Information clerk)

“Because I personally have designed some forms to make things easier, you know you can keep daily stat added up at the end of the week every Friday afternoon. But just at end of the month, they run around, they get to count. They don’t utilize the easy form I think even that time when we work before I was a manager, stat was not important to me. I fully understand where they are coming from, but now unfortunately my duty is to explain to them why it is important, why we have to complete, why I need the stat at a certain time.” (Information clerk)

“I checked and validated the data for the gaps and I signed off. For instance, if we provide services, but nothing is filled in, that is one gap; the other gap is the difference between the total, you know you looked at the last month and this month, why the decrease or increase. You will get minimum and maximum, you would go ask why ... I would also ask to see, 5 last month, 5 this month - we looked at trends.” (Facility manager)

The following quote suggests that some facility managers involve information clerks in the process of validating information:

“The information is coming to me and the two of us (with information clerk) go through, I check and see if there are any queries, investigate and then sign off, if it is OK. I am checking everything from the beginning to the end.” (Facility manager)

“The facility manager ... when he/she is done and satisfied with the information and then I send it through. But I believe wherever I send the information, so where you send, they also validate and check, before they send through, that is how the process works.” (Information clerk)

The information clerk has a different perception with regard to validation of the data:

“The validation of the data would still be done by the mental health nurse on the final analysis before it comes to me, because if I can say my form itself is just to collect the data, in other words it just collects raw data placed on the RMR, and have that stat ready for your government provincial. Then the information comes to me again, but I will now analyse and add up the data to the final point where I have got the total patients for that month. Automatically I still got to do that with the facility manager as well for a second opinion. The facility manager of every facility must see your form in case you might make an error there ...” (Information clerk)

The study further found that information clerks have different understandings in terms of where the validation should take place. The following statement supports this:

“...what is happening is the information officer from substructure gives us the validation, then he will have to comment on that information. For example, last month it was..., we had 6 patients for transfer in and last month there were 12. So there were some discrepancies, so they will comment why 6 and 12 or zero. So we will have to comment why we have so many transfers in or transfers out. So we don't analyse the information.” (Information clerk)

“What happens is that when auditors come around the hospital and go through the statistics and ask you for hard copies of the stats because they trace it back on the paper trail and they come to the doctor's tick sheet and they see, but on this tick sheet on Dr 'X' saw 20 folders, that is, actually go to the folder numbers; however the person didn't even come to the health facility on that particular day. In this case the auditor-general will hold that doctor responsible for those inaccurate stats.” (Information clerk)

“Mental health you have got total mental health clients seen, but that comprises of new mental health clients, old mental health clients. So your total mental health clients that you have seen in a month is 60, OK, your new mental health clients and your old mental health clients must add up to 60. It cannot be more than that. If it is more than that or it is less than that, you need to backtrack ... at the end of the month we use this information and you compile like a graph.” (Information clerk)

“The facility manager looks through all the things, but the number is so high, last month was low or high. I always go to them and ask them, is it true that there are so many patients last month and low in this month? Why is it low? There are all the reasons they have explained – perhaps the reason could be a lot patients default/interrupt ... but it is mainly constant.” (Information clerk)

The validation of stat includes the total record of the patients who paid visit to the health facility monthly or who were referred to the other hospitals and the record is checked to assess whether they are too high or too low. They always have to compare the current results with the previous months. In the case of irregularities or errors on the report, the substructure office sends the report back for correction. The facility manager, including the information clerk/officer, takes back the stat from where it was originally collected to rectify the error, and resend the corrected stat to the substructure office.

In summary, the information validation process at DHIS was done by the facility manager; there were no structured criteria for information validation. Validation was merely done for checking if there were major discrepancies from the target (less or higher number of patients seen per month). The process failed to improve the accuracy and consistency of information collection and processing.

4.2.2.3 Feedback on information processing

The 2011 South African District Health Management Information System policy stipulated how feedback on analysed data and reports should be provided hierarchically for the health

establishment to enable them to compare their results on data quality and programme performance with peers (DoH, 2011). Feedback is an important part of information systems to improve the quality of work, motivate the actors and improve outcomes. The findings of the analysis of the study reveal that the feedback was not provided to people at ‘ground level’. Almost all the respondents agreed that data flow is one way – that is bottom-up – and there is no feedback from higher management level related to the data sent up every month. The health facility managers have quarterly meetings with the substructure office, where they discuss and compare their work with other peers in terms of achieving the target. However, the feedback on the analysed data was not communicated to the ground level clinical staff and information clerks/officers, and that there was no horizontal information communication or reporting. This also created a concern for the health workers as they did not know whether what they were doing was reflecting as worthwhile or not.

The following findings from the data demonstrate this point:

“Computerization, regular feedback for the management, getting a clear outline as to what must be collected are more useful.” (Mental health nurse)

“We don’t get feedback from the top. However, if things are not according to what they think or want, not right/or wrong, then they will come back to us. For instance, nationally they will say, if I must take example, say this is HIV statistics, nationally so many patients died, say 100 died out of 10,000 patients, then the minister would say, no according to you, you can also calculate 100 into 10,000, if you do that, how much will be for a year, for a month, for a week. Then they count and look where was the problem, and then they might discover that the doctors didn’t put on death certification of the patient who died from AIDS, he put patient died of natural causes. So the minister was right, there was nothing captured to say the patient died of HIV/AIDS. That is one example.” (Information clerk)

Similarly, another information clerk also reported that feedback was received only when there was an error in the reported data had to be corrected:

“... to be specific I have never got any feedback, the only feedback I got is, maybe if there is some discrepancies, when there is something they are not sure of, or doesn't look right, and then they call me and say look there is something we are not sure of, can you please double check for me. Then I check, I go back to my report, I see OK, I do correction and fix it and I resend, basically that is the kind of communication.” (Information clerk)

Although the current content of reporting patient information is not sufficient to reflect or give a clear picture of health service provision, some of the health professionals actually wanted the feedback in order to measure or rate their performance. The data further illuminate this:

“I send you the statistics, this and that, I want to know what the feedback is - is our work reflecting, how are you rating, does it really show. They always want things on the date line, they never send feedback. That all goes to the training; the clinicians always need to be trained, but if they don't see feedback they think there is no point to work on the stats.” (Mental health nurse)

“They will normally give you feedback as well into there or email you again. For argument's sake they will tell you that certain things are wrong or maybe certain numbers are not correct. Feedback – when basically something is wrong they send feedback with that one, but so far actually I don't get so much feedback into there ...” (Information clerk)

“Mental health will always be high, so if they look at employing of new people, we get more support. We don't know, the feedback doesn't come back to us: this is how the stat looks like, but this is how it is supposed to look.” (Mental health nurse)

The facility managers have meetings every four months at substructure office to discuss the feedback sent from the provincial DoH based on the monthly report sent from the health facilities. The focus of the meetings is to discuss why certain facilities' reports are below the target, while others are doing well. It also opens a platform to learn more from other facilities that have done well in terms of achieving the target. The facility managers have different views in terms of feedback:

“A feedback comes every quarter on Plan Do Review (PDR) meeting where it is presented to us, where there are facility and operational managers from different facilities.” (Facility manager)

In addition, some of the health workers expressed their concern about not receiving feedback for the data they sent to higher health management level. The one-way reporting system made them perceive that their work was not reflecting. The findings from data further demonstrate this:

“... data always goes up and no there is no feedback in terms of analysis report, so that is the problem, because when you feed them, they must give report back, direct for us at each level, for the facility, saying this is the population, these are the serious cases, this is that.”
(Mental health nurse)

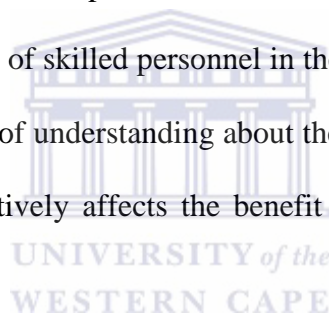
“... normally, well since I have sent the data to them, I haven't received any report/feedback. Basically what they are doing with the information is nothing I know of, no feedback was sent to us at the bottom level. The only time we get calls or email from substructure office, is when there were discrepancies/errors in the reported data and we have to correct the error.”
(Information clerk)

Some respondents indicated that the only time they received feedback was in the form of instructions, when there is a new tool to be implemented or to be used. However, the reasons why there was a sudden change to a new tool and why the previous one was done away with were not given.

It was stated that one of the weaknesses listed in the DHIS policy was the inadequate involvement of health managers at district, provincial and national level in data validation, analysis, reporting, feedback and use (DoH, 2011). It seems that there is a central problem in managing the data, improving the channels of communication and quality of feedback between the programme managers and from top to bottom. Evidence suggests that organizational forms of feedback are the most important engine in driving the organizational work (Cook, Harrison & Wernick, 2006). These authors further illustrated that understanding the role of feedback in information systems requires a holistic and systemic approach, because an information system is characterized by interaction between people, software and

the organization. It is not only top-down feedback that is influential in modelling the health service activities, but also internal feedback (within the organization) is equally important. Despite the potential for contributing to health service delivery, a HIS is typically designed for extraction of information to report to higher level. The benefit of this information is rarely available to the service providers, their patients and frontline health supervisors. Therefore, incomplete and poor feedback contributes to negative implications for the outcomes of mental health services.

In summary of this section, it seems that lack of feedback to the health providers was the central problem and there was a communication gap reflected at all levels of programme managers and between the staff. Both top to bottom and internal feedback were non-existent. This could also be due to the lack of skilled personnel in the information management system at all managerial levels, and lack of understanding about the value of feedback in information systems. Lack of feedback negatively affects the benefit of information for health service improvement.



4.2.3 Inadequate information competency

Competency refers to the capability to apply or use the set of knowledge, skills and attitudes an individual possesses about a particular subject (Lenburg, 1999: 312). The study identified that there was a lack of competent human resources on information management at the district health facilities in the Western Cape. It was highlighted that lack of a staff skills development programme in IT affected the quality of information processing. The training given to information clerks/officers was not adequate to equip them with the knowledge and skills needed in capturing, processing and interpreting patient information to be used at the floor level. The author further stressed that the staff needed to be given training on information management system; for instance, the information clerk should be trained on how to capture

information on the computer system, analyse it and give meaning to the data so that staff at the floor level can understand what is happening in the facility.

The participants reported that they were not technologically equipped to use the computer and they also needed psychological readiness to use the equipment, because the appropriate usage of equipment could affect the quality of information processing. At the time of the research, everything was done manually. Most of the participants reported that they needed training in data collection and processing at facility level, because it requires more than basic knowledge and up-to-date information to work with the data. The findings from the data demonstrate this:

“... it is useless to give them a computer and they don't train the people, it doesn't make sense, they don't know how to use them. They don't teach them 'listen these speak to one another and then just enter the data and you get it' and now you look and it doesn't make sense. So this is what is currently happening. This is what I see currently. ...so they collect the data, they take all the time and effort and when they look at it, it doesn't make sense. It is like looking at 30 patients a month, but only having 20 diagnoses or 16 diagnoses. They don't pick it up, simple, simple things like that.” (Facility manager)

Participants also reported that there was a knowledge gap in terms of understanding why information is important, and this had an impact on the quality of information being collected:

“Information clerks were employed without any knowledge and skills in health information management systems, but they were given the task to just collect the data. They are not capable of interpreting the information; in terms of their intellectual and educational abilities, they have a direct impact on the quality of information.” (Facility manager)

The majority of facility managers have a perception that the staff don't have an interest in patient information collection and processing. They lack insight about the importance of information. The following quote illustrates this:

“There is a gap in terms of knowledge and information that is available. ... you need to have proper people in place that have good understanding of how important the information collection and also working with the data is, so that the data have meaning, and simplifying it for the people to use. As the manager I am interested in it, but the nurses are not necessarily interested in the stat, but if you explain the stat, like here we have improved our survival rate, the chances of the patient or survival rate, we have improved it.” (Facility manager)

The responses also indicated that there were problems among staff in terms of attitudes to learn the new technology. Despite the training given to them, they were unable to improve their skills. The concerns are demonstrated in the following quote:

“... because of all the mistakes, the health information is always busy with training and workshops to make them understand, because of the attitudes there are people who can't train.” (Facility manager)

On the other hand, some of the information clerks believed that they had knowledge and knew how to analyse information, although this was not practised in real terms. The following quote is an example of such responses:

“In terms of analysing the information, I have more or less knowledge to go about that, I have been to training and my colleague also trained me quite well before she left to analyse information. I know what I am doing, what this is for. I have notes as well that I can always go back and refer to. I can't say I mastered it, but it is a learning process, but so far so good. I can't really say I can do graphs, not yet. I am in training.” (Information clerk)

Some facility managers reported that they were interested to learn about mental health and information systems, because mental health is not their priority area in the health system and has never been on the agenda, even at the national level. It was realised that empowering of the staff about mental health and information systems and monitoring the activities through a computerised system is the key issue to improving the quality of district mental health services. The following data extract indicates this:

“Like I said I need to be empowered with knowledge and this kind of thing. This discussion about mental health is a reciprocal for me, this relationship currently, where I am learning. I hopefully am also giving you information which you also can use. ... you know, I want this form online, I want to know what is happening within my waiting area in my computer. I don’t need to walk to see, I want to see what is happening in the doctors’ room, who is waiting... what is the type of patient we have diagnosed this morning. That is why I have a computer in the mental health room. The second part is that 18 computers are arriving in the next few days and 15 more computers within next financial year after April 2012. The whole area will be computerised and we will make sure everybody can have their patient information on the system.” (Facility manager)

Others also realized that there is not much training for the staff on data collection or information systems; it is therefore something they need to look into. The following are comments from participants of different designations:

“They need to know how to check information, how to compile tally sheets, all those things, which I think is impacting on the process.”

“I think they should have it in the skills development programme, or every employee’s skills development plan.” (Information clerk)

“Continuous in-service training can also be helpful, so everybody needs to be trained and informed on this.” (Mental health nurse)

The participants further indicated that an information system is dynamic and needs updating all the time:

“You see! If they can provide more training and keep up to date because you must remember this it always changes. Information management always changes ...” (Mental health nurse)

“We now are in the age of technology, so having better computers, having more storage space, would be much nicer and make your life much easier and then follow-up training, you know, refresh yourself to learn new things ... like I said SINJANI program [computer software for the storage and processing of district health information] that is only stored at district office.” (Information clerk)

The recent national district health information policy also indicated that there were shortages of experienced information officers and a lack of high-level technical expertise required to provide public health intelligence on information, this was as a result of lack of human resource development planning and career paths for health information personnel (DoH, 2011). The other problem identified was that information management and technologies were not part of the medical or healthcare training curricula. Previous studies indicated that the applications of information systems require knowledge and skills for effective implementation and desired outcomes. Furthermore, data collectors' and collators' knowledge and skills on how to collect, collate, verify and add up monthly reports has an impact on the accuracy of information processing (Heeks, Mundy & Salazar, 2004).

It is also evident that knowledge on how to use modern ICT offers tremendous opportunities to reduce medical errors, to support healthcare professionals' availability of timely, up-to-date patient information or to improve the quality of care, and to increase efficiency and reduce waiting times for patients, and effectiveness and appropriateness of the care (Kohn, Corrigan, & Donaldson, 2013; Bates, Cohen, Leape, Overhage, Shabot & Sheridan, 2001). However, there can also be hazards associated with technology in health care, due to the fact that ICT may be inappropriately specified, have functional errors, be unreliable, not user-friendly, or the environment may not be properly prepared to accommodate the ICT in the working process (Heeks *et al.*, 2004; Southon, Sauer, & Dampney, 2001). The information management has always been changing, which requires training updates for the staff.

To summarise this section, it seems that there was a lack of competent human resources in the HIS in general and in mental health in particular; therefore there is a need for information competency-based training of all personnel involved in the HIS (collecting and processing, analysing and utilization of health information) as well as a career development programme in the HIS.

4.3 Mental health information flow within the district health care services

This section reported on objective two of this study, which was to determine the mental health information flow/pathway within the district health services. It analysed the process and practices of mental health information flow within the existing DHIS. The findings emerging from mental health nurses, facility managers and information clerk/officers were clustered. The central theme that emerged from the analysis of the data was manual and electronic information processing infrastructure and networking.

4.3.1 Manual and electronic information processing infrastructure and networking

The term infrastructure is a common one that integrates hardware for computing, data and networks, digitally enabled sensors and facilities and interoperable software and middleware services and tools, and usually associated with the Internet (National Science Foundation- CyberInfrastructure- Council, 2006: 6). Health information flow involves infrastructure and networking. The use of manual information processing can be face-to face or by postal delivery, whereas the use of electronic information processing involves technology such as fax and the Internet/email (Boustany, 2007).

In this study the participants perceived that the current district-based mental health information flow was mainly based on manual labour and to a less degree on electronic means. The use of electronic information processing was very limited at the district health facilities where the study was conducted. The following three subthemes emerged from the central theme: manual information processing and networking; electronic information processing and networking; and information system analysis and utilization.

4.3.1.1 Manual information processing and networking

The manual information flow process involves paper-based data collection on tallies from activity registers at the service point; analyses, and dissemination to end users (Vital Wave Consulting, 2009: 24). It describes how data should flow from the point of data collection to the point of indicator analysis and interpretation within a database (Vital Wave Consulting, 2009: 24). The participants reported that paper-based tools were the main ways of collecting and reporting of patient data:

“The patient statistics are collected daily on tally sheets and monthly reported to higher level using mail services or direct delivery face to face; however, a few health facilities have started to use fax and email to send reports to substructure office.”(Information Clerk)

In the manual information process reception is the first place where a patient makes contact to obtain health services. At the reception patient information such as name, address, age and folder number are recorded in the register book and/or on the computer (if a computer is available). Detailed patient data and clinical information are recorded by clinical staff during consultation. The following quote illustrates the movement of patient information within the facility:

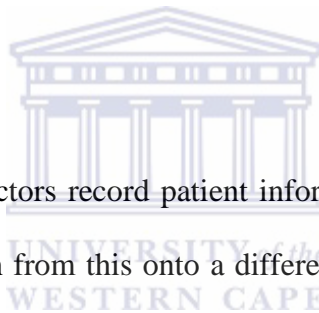
“In many cases the movement of the patient’s folder between reception to clinical staff, pharmacy, laboratory and store is done by either the patient himself or the staff. Patient information is recorded on different forms, such as on the patient folder, register book, diary book, tally sheet, progress note.” (Mental health Nurse)

Some participants reported that the danger of patients carrying their folder is that the patient’s folder or information in the folder may get lost in between the different health stations/departments, and in some cases patients took the folder home. These was regarded as a serious problem by some of the participants due to its legal implications, and also the time

spent looking for the lost folder or information. This creates barriers between patients and health service providers as it delays attending to patient problems.

The patient information flow across other health facilities was mainly conducted by means of patient delivery, mail and sometimes telephone or fax. Fax communication is faster and contains complete information and documentation, but is not always available, or sometimes the response from the other side is slow. As a result, the help supposed to be provided to a patient is delayed. The following quote illustrated patient information flow between facilities:

“The manual patient information exchange usually created hindrance in the exchange of patient information on time and loss of the patient referral letter or discharge letter sent by patient, which in turn affected the management of the patient’s problem on time.” (Mental Health Nurse)



The mental health nurses and doctors record patient information on a tally sheet on a daily basis and transfer the information from this onto a different form (weekly tally sheet) at the end of every week. The information clerk/officer collects the weekly patient information from each service station at the end of every week and then collates the patient information and transfers onto the RMR sheet, preparing for the report. The information prepared on the RMR is sent to the facility manager for validation of the data and signature. Once the validation is done and signed by the facility manager, the RMR is sent back to the information clerk, where it is dispatched to substructure office. The substructure office does the data clearance, filtration and validation before it is sent to the District Metro Health Office. In case of errors or inconsistencies in the data, the substructure office would contact the health facility manager to rectify the error and resend it. This has been reported as a day-to-day challenge for both facility managers and information officers in identifying where and at which service point the discrepancies were created, and this in turn usually created tension

between the clinical staff and management. The following quote illustrates this channel of information processing:

“... every month the report is sent to the substructure office; in case of under-reporting or errors, the report comes back for justification (such as why there were fewer patient visits reported) or correction of errors,. Once the information is in order at substructure office, then it is sent to the District Metro Health Service, and from there the information is forwarded to the provincial and from provincial to the National Department of Health, where all the analysis of information is conducted.” (Information clerk)

Information flow paths within or between systems can occur through multiple models (Garrett, 2008). Information can flow between the supplier and the recipient directly (face-to-face) or through IT (email). For the mediated information flow path, the use of IT is required to allow information to flow, while the unmediated flow path (face-to-face) does not require IT to transfer the information (Boustany, 2007). Within the facility information flows, such as from the information collector at the service point (clinical staff) to the information collator and the facility manager, were conducted by using unmediated technology, which is directly handing the information face-to face, while between facilities and health authorities information flow were conducted by using both mediated IT (email, fax, phone call) and unmediated IT (direct face-to-face delivery or mail).

The DHIS data flow policy provides guidelines about two-way information flows, that is, information received from the health facility by higher health authorities should be analysed and the results sent back to the health facilities in the form of feedback for action. This vertical data flow policy was illustrated as follows:

“... by the 7th of each month, the data in the RMR sheet goes from health facility to the substructure office, the information officer at substructure office transfers the information from the hard copy to electronic software program called SINJANI. They use SINJANI program for checking of the information for discrepancies by comparing against the previous

report, but no analysis of the data is conducted using SINJANI computer program at the substructure office level. By the 15th of each month the data are transferred to Metro Health District Office to the head of district director and primary health care manager. Then by the 20th of each month the information goes to the overall information manager in the province. National Department of Health receives data on the 30th of every month from all the provinces.” (Information officers)

The timeline policy for the monthly information submission on time seems to be improving with hands-on assistance from the substructure office to keep it on time.

The facility managers and some information clerks perceived that at national level the purpose of collecting data is understood, as such data are used for budgeting and staffing for health facilities. However, responses obtained from most health professionals indicated that they do not have an understanding about where the data were going, and the purpose of collecting and reporting the data. This resulted in poor responses and accountability from the health workers in collection and processing of quality information:

“The data collected from district health services always flows upward to national, but no feedback is given back to the service level in terms of the analysis of the data. This has become a problem in determining the service provision, because each level of the health facility should get feedback on the service provision; they need to know if there are serious concerns, populations at risk or case management.” (Facility manager)

The following statements indicate how the lack of skilled personnel affects the quality of information processing:

“Data is not adequate, data is not always recorded, our stats is not the true reflection of what we basically see, we see much more, but since it is not recorded adequately, it is not there. The other challenge is my information officer is not that much on board, as you know. Now I need to make corrections and say that this doesn’t make sense, you know, how can this be, things like that, so at the moment it is a big thing because it is my personal goal to work on it myself until it is validated, it is reliable, all those things that it should be ... ” (Facility manager)

“... there is a lot of paperwork here to be honest ... to decrease the amount of paperwork, getting computers for doctors and nurses, if every room has computers. I thought that but I don't want to say it because it seems like a dream. You have to be optimistic; there are a lot of challenges in the department.” (Information clerk)

“... at the moment you don't do the right referral. Doctor must do his own work up again while you already have the full history of the patient that the doctor needs ..., but the way it is now is just a waste of time. I think technology assists for data capturing for any visiting patient in the facility, you get full record, and enter the basics of the patient in the computer, so if you can find this you can click the button on the computer and send all the things to the doctor. It would be more orderly, more structured. However, the way it is now you write on this paper today, on that paper tomorrow, you see, so you are missing a lot of information by having these folders we currently have, because I will take a new paper and then it didn't follow orderly, because you didn't staple it and make it orderly, and that can get lost because it is just lose in the folder. So you do not want to sit with things that have been lost, you just seen it in the result, it is in the computer, it is there, so it will be much, much easier.” (Mental health nurse)

Additionally, some respondents believed that the clinical staff were not doing the right things, despite the information provided to them on how to collect the information:

“I think this is where we have a problem. Like I said train, train, do what we do and they also start what they do and especially doctors, eventually they leave. Administrative people we don't have a problem, but clinical people there is a problem. They don't see the importance, but tell us we need more staff, we are working too much. If you show them the information they collected that they were giving to you, then they say no that is not true.” (Facility managers)

In summary, the current system of patient information recording and processing was mainly based on manual means. The electronic reporting system has very limited, but some facilities are slowly moving towards an electronic reporting system. However, manual information processing and reporting are conducted in a fragmented manner. The district health information flow was not practised as it was stipulated in the DHIS policy, as a two-way system of information flow. The study has shown that information flows only one way, in a

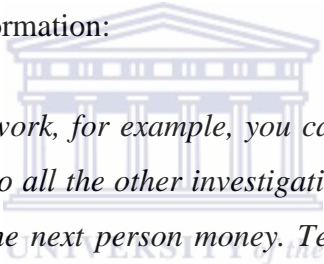
bottom-up approach, and there was no feedback in terms of the data analysis result from health service providers. This has created discrepancies among the health workers and management people in processing quality information.

4.3.1.2 Electronic health information processing and networking

Electronic health information recording was defined by the International Organization for Standardization (2004) as a repository of information regarding the health of a subject of care in computer-processable form, stored and transmitted securely, and accessible by multiple authorised users (Garde, Knaup, Hovenga & Heard, 2007: 2; Hayrinen, Sanranto, Nykanen, 2008). Others define electronic health records as a healthcare record in a computer- readable and -processable format (Begoyan, 2007: 1). Among other requirements, such as policy and financial viability, the HIS requires technological infrastructure for its effective implementation. The electronic health recording and processing is to support continuing, efficient and integrated health care and to improve the quality of it (Hoerbst & Ammenwerth, 2010; Hayrinen *et al.*, 2008). However, here there are also challenges, such as cost, which becomes a critical factor for health care, and the need for cross-border interoperability (Hoerbst & Ammenwerth, 2010). The Third International e-Health Conference held on 21-22 January 2012 in Pakistan stressed the need to move away from a dependence on tools, such as paper and human memory, to an environment where patient care providers and healthcare managers could reliably access and share health information in real time across the geographical and health sector boundaries (e-Health Association, 2012). However, there are concerns about the confidentiality and safety of patient information in electronic HISs, which needs to be addressed.

In the digital HIS, it is essential that medical information is kept confidential (Miller, West, Brown, Sim & Ganchoff 2005). The author further states that as the industry moves toward

the web services model where information is made available on the World Wide Web, security and privacy take greater importance (Miller, West, Brown, Sim & Ganchoff 2005). In any organization information infrastructure has the ability to assist to process information and make decisions, and determines the organizational productivity, capacity to monitor the internal and external situation, and quickly respond by introducing new methods or preparing to address emerging problems or adjusting/restructuring the services (Darbuceanu & Fox, 1994). However, this study has shown that the development of the technological infrastructure for a district health information management system is still at a very elementary stage. Participants expressed that electronic databases for collecting and reporting data could have made their life easier. The following findings state how technology assists efficient processing of patient information:



“... Technology simplifies your work, for example, you can send them the patient result by email so that they don't need to do all the other investigations because it costs you money, it costs them money, and it costs the next person money. Technology saves us time, saves us finance, saves us on actions, ... what technology can be upgraded to such an extent that ... now the Khayelitsha Department of Health on the BlackBerry you can look at your patient's details, which is so nice. Before you actually see the patient, you already know why the patient is coming. You know exactly what the plan of action is.” (Mental health nurse)

A facility manager reported that they had ordered about 15 computers and were planning to buy more in the following year. This will assist them to put basic patient information onto the computer:

“We are in the process of having the computer, but we are not yet there. There are still handwritten, pre-prescribed tally sheets, you know different divisions of mental health chronic cases. The staff have got computer training, they are getting continuous training. There is also a data capturer there; he is coming on a regular basis. He puts the patient folder on the clinicom on the system: name of patient, folder number, address, ID number, gender, and age are loaded into the computer. If the patient loses the folder number, you can get it easily from the computer.” (Facility manager)

The development of IT infrastructure is dependent on the availability of financial opportunity. Most health facilities have financial constraints and have to prioritise the most important requirements to run the health services. Therefore, developing a technology infrastructure is considered as the budget allows. For example, they may buy two or three computers per year, and then try to install a network, such as the Internet. The following findings illustrate this:

“... unfortunately because of financial constraints we can’t give everybody an email address because people will get private business on the email, but have access to computer due to staff computer training. We have some computers in the facility and are waiting for four more computers to be utilized by other support services, one for orthopedic males, we got for clients to make appointment, to load patient details, we got three computers and also another person appointed ... I looked at my budget you need such a lot of things. What is the priority? Do I have to order five computers this year or two computers, or some other things that we need. We got a new software system. You need to balance out our problem. We have two PCs for the clerk, one is for making an appointment. This is an advantage for the two ladies to work on, to send information that is quality ...” (Facility manager)

Some participants have expressed their concerns about the capability of some information clerks to learn computer skills. They stated that although computer training was given to information clerks to improve the quality of data capturing and processing, there are still problems with the quality of information. The following quote further illuminates this:

“... always we are giving them training, how to do things, why to do things ... at facility level it is not proper, they are looking at the information system, since an electronic information system at the facility is not in place. Information generated from some bodies heads onto a paper, so it is mental health who tick off – that means there is a lot of data loss somewhere. ... if it were to be in an electronic system you can scan or whatever, it should be simplified, but currently it is not happening ...” (Information officer)

“There is a lack of skills to analyse and interpret data by information clerks. You can’t expect the clerk to analyse and interpret the data because in our level we can’t analyse and

interpret. But process, they are obviously getting constant training. The requirement for information clerks to be employed is to have information management knowledge.” (Information officer)

“Ninety per cent of our job is Excel computer software. Information management consultation involves process, and you need people on planning, decision, problem solving, so nothing is a linear process. It is the whole jungle of work and also to fix before 4 or 5 every month, you know what I am saying, it also very fragmented, but suddenly the manager wants a report and the substructure office want a report and there are outstanding data queries.” (Information clerk)

Contrary to what others said, one information clerk stated that they did not have a problem in collecting information from the health care providers:

“Getting information from service point is not a problem in this facility. We have a computer, but we don’t record patient information on the computer.” (Information clerk)

The majority of the participants emphasized the importance of skilled personnel in the information management system, to record information on the computer and process it. Such people should have a good understanding the importance of information collection and the ability to work and communicate with data on the computer, interpret and provide meaning to the data. The following quote illustrates the need for competency in computer skills:

“I think there are certain aspects that I need to do, to be more competent on the skills in terms of completing the data electronically. Yes there is still much room for improvement as for me to get more experience and be more competent I send a report every month, if there seems to be certain queries in that sense they do send it back to me.” (Information clerk)

“... they are still busy in the process of making it that all the data collected may be scanned and electronic so that will make it easy for us instead of working with papers.” (Information clerk)

Although the electronic health IT is particularly useful to facilitate timely communications between health facilities about patient conditions, there are major problems with the traditional communication system, as expressed by one participant:

“Electronic communication between facilities to respond to patient conditions saves admission of patient and expenses. However, in the current situation there are communications problems between health facilities with regard to patient referral and/or getting patient information from other facilities. It always delays getting the patient report and delays timely management of patient conditions, and as a result the patient gets relapses and readmission to hospital. The communication was not as easy as it is supposed be in getting patient information from other health services or the referral hospital.” (Mental health nurse)

The WHO (2005b) MHIS framework illustrated the importance of feedback in the information system. Health data can be analysed at different administrative levels, for example at provincial level the HIS directorate receives data from all the regional HIS coordinators, analyses and generates a regional summary, and then the feedback summary of the analysis results is forwarded to the mental health directorate, which reviews and analyses the summaries; the findings and their indications for planning and service management back to the mental health regional coordinator. Then action is taken in various aspects of health facilities such as planning, management and service delivery. At the level of the mental health worker, receiving the clinic summary from the head nurse may indicate a need for better time management with patients in clinics (WHO, 2005b).

Most of the mental health nurse participants reported that they have no knowledge where the mental health information is reported and used, as they have not received feedback in the form of analysis from provincial or national HIS coordinators:

“Let me be honest, I am not sure where this information is going, because I mean we have not really had any feedback.” (Mental health nurse)

The HIS works adequately when the following prerequisite needs are in place (WHO, 2005b):

- Information policies - the existing legislative and regulatory framework for public and private providers, use of standards;
- Financial resources - investment in the process for the production of health information, e.g. collection of data, collation, analysis, dissemination and use;
- Human resources - adequately trained personnel at different levels of government;
- Communication infrastructure - infrastructure and policies for transfer and management or storage of information; and
- Coordination and leadership - mechanisms to effectively lead the HIS (WHO, 2005b).

In summary, it seems that technological information infrastructure is important to facilitate the quality of information processing, decision making and effective healthcare delivery. Moreover, it simplifies the work and improves quality of health service provision. However, this may require adequate budget, technologically skilled personnel and policy. Many health facilities didn't have electronic infrastructure for information recording and processing at the time this study was conducted. The lack of information infrastructure such as digital databases, software, hardware, technologically skilled personnel, Internet, and an electronic storage system affected the quality of the information processing and decision-making process and delivery of efficient health care. The confidentiality and safety of patient information need to be addressed appropriately in electronic health information recording and processing systems.

4.3.1.3 System for information analysis and utilization

The MHIS is a system for collecting, processing analysing, disseminating and utilising data to improve service delivery (WHO, 2005b: 13).

According to the responses obtained from participants, there were no system for analysis or interpretation of data, but common uses of information included determining the load of patients, which was basically the headcount. This was done by making comparisons with other health services, and looking at the increase in the flow of patients into the facility, such as an increase in the cases of substance abuse in the community. Usually making comparison with the previous month's total number of patients that visited the health facility helps to see whether there is an increase or decrease in the current month:

“... How many patients we take for the month? This month it was like 12 000, last month it was 15 000, so other months like 14 000, or 13 000. The minute it goes up, immediately its rising, it helps for the manager, because they need more stock of medicine more staff, more equipment.” (Mental health nurse)

At some facilities the data were used to compare staff work regarding who was working more towards achieving the target and who was not. However, it seems that this was creating problems among the clinical staff, because some wanted to see and assess and manage patients holistically, which takes time, but does not contribute much towards achieving the target. Others would see a patient superficially and work faster in order to see more patients so that they can achieve the target. This also creates questions, such as what is the quality of care being offered, and what are the outcomes of chasing targets? Are patients benefiting from this type of services or not? The following quote addresses this issue:

“... for instance we got four primary health care sisters, now if we collect this stat from each of them, they will see and then we draw like a graph and then it will print out for this month that the sister in room 2 only did like 100 patients, where room 3 sister did 150 patients and

that sister did like 50 patients or 70 patients. That will indicate who is actually working, but the staff didn't like this because it shows them that they are not working." (Facility manager)

Some participants stated that even at the level of substructure office, they do not analyse information but contextualize it in terms of targets; if the population is 'x' amount, then what is happening in the facility in terms of clinical work days:

"... so if the target is not reached, why you didn't give an average of patients seen per day, average for subdistrict. We do analyse in terms of contextualizing data ... meaning we don't really analyse the data but we just look at the target, and so on, and give them an average per day; nobody is skilled to analyse the data to be used at the facility level." (Information clerk)

The responses indicated that they do not have much understanding about the utilization of information at higher levels, as indicated in the statements below:

"If you ask what they do with the data at a higher level, I don't know what they do with the information, but I know what I need to do with it. We need this for resources, because just for people to say capture this and record this, but they don't know why." (Information clerk)

"We don't analyse the data here, we collect everything they ask and send it to them. We don't put it on the computer system, that is why we keep everything on the hard copy." "No adequate knowledge in analysing information, can't make a graph, but in a learning process." (Information clerk)

Information is a means for improving the health of the nation, but the availability of reliable information does not guarantee its use or improved decision making, because decisions are often driven as much by politics as by evidence. However, it is critical to design information analysis systems to interpret the information and utilize them to plan and improve the services, and to create a culture of evidence that provides incentives and accountability for evidence-based decision making. Analysis of information and extensive dissemination of information promotes widespread use and accountability.

During the interview session, the researcher observed a few health facilities where some information clerks used Excel sheets to create graphs and place them on the wall where the staff could easily see them. This helped to show the clinical staff whether there was an increase or decrease in the number of patients seen per month and if they are on target or not:

“We draw a table to show or like a graph and it needs to be placed up in the facility for the nurses to see. Oh I saw so much patient, oh its dropped” (Information clerk)

An effective HIS requires a standardized structure for data collection, collation, analysis and utilization for decision making throughout the health sector. The standardized comprehensive design enables system development, reduces redundancy, increases efficiency and improves interoperability (O’Carroll, 2003).

In summary, the system for analysis, interpretation and utilization of information at health facilities is not developed. Common practice was to use data collected for staff allocation. It was also used for determining who is working towards achieving the target. However, many health workers were uncomfortable with the idea of chasing numbers/headcount, as this affected the quality of care and services, even if the total number of patients seen per month determines the amount of budget allocation. Vertical (bottom-up) reporting of data monthly is commonly practised, but there was no downward feedback to the health facilities in terms of analysis of results of the data. It seems that there were data management problems both at the DHIS and national DoH.

4.4 Factors affecting a DMHIS

In the quest to achieve objective three of this study, which was identifying the challenges that were experienced in the DMHIS, three themes emerged from the study as the major barriers:

poor organizational support, inadequate information competency, and low prioritization of mental health.

4.4.1 Poor organizational support

Organization support refers to the allocation of appropriate resources, such as financial, technical and human resources, to mental health services (Routine Health Information Network (RHINO), 2006). The participants reported that there was under-allocation of resources for district mental health services. For example, there was no the technical know-how to develop indicators, design data collection tools or develop procedural guidelines, and a lack of computer skills, computers and software for data processing and analysis.

The following extracts from the data indicate the current challenges:

“... the fact that it is not computer-based, the fact that staff are not computer literate makes it difficult to process the mental health information, because there is no budget from the government to develop a computer system for mental health services. Everything is done manually. Everything basically has to wait for everybody to do the total, while if its computer-based, it would be done automatically. It is time-consuming to do it manually. I think that is the biggest problem.” (Mental health nurse)

The participants pointed out that the paper-based patient information recording system was tedious and time-consuming. They emphasised that a computer system for data collection would perform better in recording and processing the information. This is evident in the following quote:

“It must be computerized, because the manual thing is time-consuming and always inaccurate. I think technology improves ... It will be much better even at data collection and recording level. I know it may take many years to get there, but my vision around the improvement, around the health information technologies, is to assist.” (Facility manager)

Participants also reported the lack of skilled personnel is a major barrier in information recording and processing:

“The only way we can improve in information management system is when there is a dedicated and skilled information officer.” (Facility manager)

Consequently, the participants reported that the health facilities are under-staffed; clinical staff are reportedly stressed out with an increased patient load. In addition, recording of patient information for reporting has become too time-consuming for them. Therefore, this has become a challenge for processing quality information:

“Due to the huge amount of work the clinical staff dealing with are also always difficult to get accurate stat. The reason the stats are not accurate, you rely on other people’s work, where they forget to write things correctly because they are too busy.” (Facility manager)

Another important issue that emerged was loss of patient information due to paper-based processing, indicating that this could be prevented with the use of a computer system. For example, the loss of patients’ information from the folder and discharge summary letters is always a problem.

In summary, the study identified that inadequate resource allocation, such as adequate budget, lack of technology and technical skills, and human capacity, are the main challenges in recording and processing quality information. It also resulted in loss of patient information inconvenience and dissatisfaction with services.

4.4.2 Mental health receives low priority and operates in isolation

Mental health receives a low priority and operates in isolation in the district health system. It was reported that the district health system has eight priority areas – and mental health is not included in any of these. The participants stated that the mental health service area is unseen

in the health system, because it is given lower priority and attention: The following responses are all from facility managers:

“Mental health is not in the division of priority areas. You see I don’t know where they cluster the mental health, maybe under chronic diseases, but not specified in the priority area. I don’t know, there has not been much focus on mental health towards improvement.”(Facility manager)

“Struggle in terms of policies, mental health is not a public priority, there is nothing really at national level ... everything we look for in mental health data, the research report, there is no statistical information on this particular condition, which really makes it difficult for researchers and policy makers to make decision because there is no tangible information.”(Facility manager)

“Basically mental health is not included in the divisional priority area in the district health systems. There is no column for mental health as a priority area. That is where the gaps are, I don’t think it affects the outcome of care, because we are under an obligation to provide quality care. ... I think it does influence the awareness of mental health, it does affect knowing how big the problem is, it does affect that, what type of conditions are most common in the environment – that is where the gaps are. There is also a gap in terms of knowledge, information that is available, data that are available, that has a gap there, but also awareness – but not the care that patients get”.(Facility manager)

“In terms of the comprehensive health care, but not in particular to mental health, and I sat and thought with those reviewers, there is nothing on the board on mental health that they presented to us, you see. We see quite a number of mental health patients and like we see quite a number of other patients. We never discussed mental health as a programme in our facility. We have two psychiatric nurses; they haven’t reported to us. Mental health is not with standalone items, like a pap smear, TB treatment etc. are standalone items.”(Facility manager)

Some facility managers reported that mental health nurses do not work with the facility manager and so they go it alone:

“You see psychiatric nurses also go to Valkenberg every week on Friday where they report on things and have supervision, which we don’t know what is going on, because they work in

isolation, that is also a problem. They never share or discuss with the facility managers or other staff the purpose and outcomes of their Friday meetings. They take this as their own issue. A lot of areas in the health systems they work in isolation and not as conjoint to a big whole. Therefore, you must have a system approach to your services; if you don't have a system approach, you will have these little islands where people are functioning separately you know."(Facility manager)

"You don't know what is happening behind closed doors with the psychiatric sister, she does her own thing, and you are scared do go in. She already feels isolated, she thinks I don't care a lot; it is bad. I think it is the nature of the work, but must make opportunity. I am feeling guilt, and to rectify it is not easy ... I don't communicate with her a lot, there is a kind of barrier. She knows she is good, she wants to hear it from us and to see if we are involved with her." "The only support we offer to mental health nurses is office space only and nothing more." (Facility manager)

Although some participants reported that they do not have a clue about the purpose and importance of the Friday psychiatric nurses meetings, the mental health nurses reported that they have consultative and supervision meetings with the psychologist and psychiatrists on Fridays to discuss the management of difficult cases they have encountered during the week. They also stressed that there was no support for mental health from the facility. The following quotes illustrate responses from mental health nurses:

"At such meetings psychiatric nurses receive professional support from psychiatrist consultants/psychologist on how they should manage difficult mental health cases or problems."(Mental Health Nurse).

"We are so overwhelmed with diagnosis of substance abuse, but there is no support on district level for mental health, besides our Friday meetings. It is good but it is not what we are dealing with on a daily basis. They are not supportive at this level. So yes it will make a difference if they can actually see and get insight into what we dealing with."(Mental Health Nurse)

“You sit here and try to do your best for your patient, but yet no support is coming from anywhere, really to be honest with you, besides our Friday support. No support here, you are on your own.” (Mental Health Nurse)

“The safety of the mental health nurses is another concern for me, I am female. As you know there is one mental health nurse in this facility. Our patients become very unstable; sometimes when we have to do admission the patient becomes violent. I have been asking since I came here for a panic button, but they have never done it.”(Mental Health Nurse)

“Ja I would like for the whole team to get involved with mental health, the way every other department helps one another. Like when I am not here, there is no mental health service. My patients get sent back home. It has got a lot of gaps, it is difficult for me to leave, and difficult for me because I don't know why they are not interested to work with mental health. I would like to see people more interested in mental health. I would like people to feel confident enough to work with mental health, to be more open toward our patients so that service delivery can improve. Treat mental health patients like any other person that comes through that door that is suffering with diabetes or hypertension. I think to me that will make a big difference ... but mental health patient get alienated here. So I don't know how you would clean up this mess ... but I do believe things will change.”(Mental Health Nurse)

In conclusion, it seems that there is a lack of a professional relationship between the mental health nurses on the one hand, and other clinical staff and the management on the other hand. Excluding mental health from the divisional priorities in the district health system can negatively influence the management of mental health. The focus tends to be only on those health services included in the divisional priorities, which will have a major impact on the integration of mental health services in the PHC services.

4.4.3 Staff understanding of the importance and use of health information

The majority of the respondents stated that most staff have no understanding about the importance and value of capturing and processing patient information. The knowledge gaps in capturing and processing information contributed to the poor information processing. For

example, some health information clerks may not be capable of capturing, processing information, and converting the information into useable form. Furthermore, the information is not tallied properly, that is, the stats are sometimes incorrect and not on time each month.

This is contained in the statements below:

“... information officer can’t even understand the mistakes? It is like here, if I make a mistake the patient dies, you know, what I am saying, because it is information and it is numbered, they don’t see the importance of it, the value of it. There is no common understanding around the management, around how important the information is and how you can use information.” (Facility manager)

“To find the gaps there is a need to have a knowledgeable person in place, who has a good understanding of how important capturing and processing information is, and also working with the data, reworking with the data, so that the data have meaning, and simplifying it for the person on the floor.” (Facility manager)

However, the health workers have different views about the information they have to collect. In this vein, some respondents reported that they had no idea as to how the information they report every month is used since they do not receive any feedback:

“I don’t know what they do with that information; I would be interested to know. What it really means to me personally, I feel it means nothing up there, it is more for us to value to see what we do in a day and really what is the mental health system all about, but I don’t get seen at higher management level.” (Mental health nurse)

Others expressed an understanding of why information is needed:

“I don’t think that information has been communicated at provincial level, all that categorical information is for clinical staff to enable them to make a diagnosis, to identify the problem, why the patient is now here, but the information collected is not to communicate with higher level, I don’t think so. The information collected with the doctor or whatever asking is putting it down and then the information is in the file.” (Mental health nurse)

Some participants reported that the attitude of staff towards capturing and processing patient information was a challenge. A health information management system is new to most of the clinical staff, who perceived that collecting information is additional work:

“The staff don’t believe capturing patient information is part of their job; they rather see it as an addition to their job and information capturing is a boring job for them. In most cases they found that the information recorded in the patient files is not recorded in the stat form, and this has been the ongoing major challenge they have to deal with every day.”
(Information clerk)

“The main challenge is that the clinicians don’t take responsibility in collecting data that is accurate; they tick on the wrong places, miss patients and/or forget to tick off.”

“Ninety nine per cent of the time I got the stat from clinician after repeated talking and reminders. Staff mentality and habit is a problem.” (Information clerk)

“I think the reason is because of the attitude ... the people don’t realize the importance of the information and I think most probably lack of training may be one part of it, but it is also kind of more emphasis that you give to information.” (Information clerk)

“You get a tally sheet, they are supposed to put down the folder number and then tick off by diagnosis categories, but they don’t do it, so at the end of the month you get plain sheets, and now you have to draw folders to see what the patient came for.” (Information clerk)

Similar sentiments regarding the need for a change in the mind-set of staff was echoed by others, as below:

“If the recording in the stat sheet is not correct, the recording in the files is just as not correct, because the files are in order, so we have to do a lot of work around the buy-in of changing the mindset of staff about health information system and involvement and participation.” (Facility manager)

Responsibility and ownership of collecting and recording accurate information are other important aspects of an information management system. This is reflected in the following:

“I am going to give you very short answer, I hope you don't mind. I think the one very important thing is staff ownership; the actual collector is the owner of the information, and if they take ownership of the role and responsibility, the information collected would be quality and accurate.” (Facility manager)

One respondent, an information officer, shared his knowledge about the principles to be followed in order to improve the quality of information:

“It is very important to use the principles of the ‘3 Cs’, that means correct, complete and consistent, to ensure the accuracy of the information. In this case training could have helped to identify the problem, but due to the workload, resources and time constraints training is not happening for clinical staff to help with the accuracy of information capturing and processing.” (Information clerk)

In conclusion, as an information system is new to many developing countries, including South Africa, it seems that the lack of understanding of the importance and usage of health information in health service provision was a major problem for the DMHIS. Moreover, lack of responsibility and ownership regarding capturing and processing information were among some of the challenges experienced by the participants.

4.5 Findings from the FGDs

The focus of the FGDs was on the relevance of information sharing to improve care for persons with mental conditions. The finding that emerged from the FGDs was lack of support and inadequate information sharing to cope with mental health conditions or behaviour.

4.5.1 Lack of support and inadequate information sharing

The FGDs showed that the caregivers lack adequate information in order to care for persons with mental conditions. Information about the type of mental illness and skills on how to handle aggressive patients are important for the caregivers to manage their own mentally ill

family member at home. However, most of them reported that they were not getting sufficient information from the healthcare providers. This made them unable to provide appropriate care for their family member with a mental condition. Some of the respondents stated that although they are caregivers for their family member with a mental condition, they also have some sort of mental problem but are in a stable condition. Furthermore, they reported that they have limited knowledge and understanding about how to manage their own illness. Thus, the participants needed adequate information about the course of the mental illness, treatment and prognosis:

“We need more information about how we can handle a person with aggressive behaviour; in this vein, we need information and skills in dealing with mental health illness. You see some of the patients do not want any visitors, or even to see their own sisters come and visit them. In such cases we do not know how to manage the situation and what exactly we should do to deal with such cases because they never get any support.”

Such support and information sharing is important not only for their welfare but also for the patient; for example, some participants stated that:

“... we would fight back if the patient became aggressive or even send the patient away from home as the patient is seen to be a danger to our family.”

The participants perceive that the doctors are not willing to provide them with proper answers to their questions about their patients, and in some cases the doctors use medical terminologies which the family or patient cannot understand:

“Like I said they never give you the right answers, with me it also happened you know, when I also see a doctor myself I ask them what is here by my hands, my hands are skew can you see; they can't answer me. I tell them I got a pain in my body; they don't want to examine me. The one doctor said I must tell the other doctor to take an X-ray of me, but he doesn't want to do it.” (FGD2)

In addition participants reported that they used to have support clubs in the past, where they could share their experiences and information about their illness, on how to care for their mental patients. However, the support clubs are no longer available at health facilities or at community level for people with mental conditions. Such support groups were useful to share personal experiences, and emotional, physical and other related important information. Since the abandonment of such support clubs there has never been any strategic measure to offer emotional and other needed support from the health workers, as they are always busy. Besides, they have cited lack of financial and other needed resources. These sentiments are expressed in the quote below:

“... a couple of years ago we had a support group here, where we had an intern psychologist who used to sit in groups with us when she had the time, and that seemed to help the people, but then they decided there wasn't any more money and things changed, and you know we got attached with the stigma, we can't come in here on the weekend because there is mostly other staff, and they don't want to help you, they are scared of you. When you feel depressed you come in, you talk, and you feel much better. It lasts a couple of days, that's what happens.” (FGD1)

The majority of the focus group participants reported that the current health service system is failing to respond to their mental health needs. For example, they wait too long to receive services at a CHC and day hospital, and short consultation time with healthcare providers, and lack of adequate information about mental illness and how to handle the patient when they are aggressive. They further stressed that the current mental health services are worsening the conditions of patients instead of alleviating them. They also pointed out that delays in attending to patients may result in their health conditions worsening. This also affected client satisfaction with the service provision. They stressed that the mental health patients need more dignified mental health services through an improved health delivery system. The following are some of the extracts from the data supporting the points above:

“The waiting is too long with the illness after we got there, but there is nothing that we can do. You sit, wait and wait; you get mad in day hospital.” (FGD1)

“I am suggesting as the lady said as mental health patients we are not demanding special treatment, but because of our conditions we tend to get angry ...the way we go to wait in front, before your name is being called, wait by sister for your name to be mentioned, for your name to be called again to see a doctor, then you wait ages – 2 to 3 hours – by the dispensary for your medication.” (FGD2)

Furthermore, the focus group participants felt that the current health systems are very weak and requires changes, especially for those people with mental conditions. They believe that their dissatisfaction with services was because of the shortage of health facilities and health workers; the health facility is not coping with the influx of patients. They suggested that they need more health facilities and day hospitals and more staff because the population is growing all the time:

“Now in this discussion we do have the opportunity to express ourselves, to say how we feel, now we are expressing it, but it is not possible to change, we have got to accept, we are not forcing it.” (FGDs).

In summary, it seems that there are problems in terms of providing the right information to the caregivers or family members regarding patient behaviour and treatment, and to empower them with skills on how to deal with patients who have different kinds of bizarre or aggressive behaviour. Support groups for sharing experiences and information seem to have worked for people with mental conditions. The participants felt that the current capacity of the health facility is not coping with ever-increasing numbers of patients.

4.6 Findings from individual interviews with caregivers and stable persons with mental conditions

Individual interviews with caregivers had similar results as the results obtained from FGDs. Throughout the discussions the participants stressed the long waiting time to receive services and inadequate information sharing. The waiting time to receive services affects the quality of services, such as consultation time with healthcare providers and information sharing about the illness, such as diagnosis, treatment, and how to handle patients. Mental health education and information sharing sessions are not practically available. The two themes that emerged here were client waiting time and quality of services, and mental health education and information sharing.



4.6.1 Client waiting time and quality of services

The respondents reported that long waiting times to obtain help in the CHCs and day hospitals are stressful. It affects their consulting time with doctors or mental health nurses, because the doctors and nurses rush to see all of the patients and the patient is also rushing to join another long queue at the pharmacy. They don't have time to discuss their stressing health problems with the doctor or mental health practitioner. However, others stated that they could not complain about waiting for too long since they were receiving free services. They also pointed out that the current stressful experiences made them feel and appreciate that the past health services were more efficient and effective. The following comments from the data illustrate this:

“Most of the time I wait long here by the chemist, and it is not only me, others also complaining about sitting long by the chemist for the pills ... Some people sit from 5 a.m. in

the morning here, and then they go home at 5 p.m. in the afternoon. It is not right. Yes, it is the truth. It is very true.” (X1)

The participants reported that patients become very impatient due to the nature of their illness and worried when they are not attended to on time. The following extracted quote from the data illustrates this:

“... I am now sitting and worried about when am I going to get my tablets. How long I am going to be sitting and waiting.” (X3)

The majority of the respondents reported that the existing health facilities and staff are not coping with the ever-increasing patient numbers. In addition, the complexity of medical problems and the shortage of clinical staff becomes a major problem in providing quality services for patients. As already noted, consultation time with clinical staff is very short or limited:

“... the staff are overbooked; feel rushed to see all patients, and thus have no time to talk to the patient or share information about their illness, as they only have 3-5 minutes to write prescriptions. Unlike other medical patients, psychiatric patients require more consultation time.” (X6)

“The pressure on the staff is very much, because sometimes there is only one doctor in the whole health facility, you see this month there are two, next month there is only one doctor. So you will wait for quite long hours. There is pressure on the doctors or nurses, they haven't got time to explain exactly what is going on or why this pill is not working, they just give you the pills and go. You can do nothing, we cannot fight them.” (X2)

“I think the only thing that is lacking in any public health facility is the time, which still remains the major issue.” (X5)

Moreover, the caregivers reported that the information they received from the healthcare providers on how to handle persons with mental conditions at home was not sufficient. The information can assist them to know more about the nature of THE illness, the treatment,

what should be done to prevent relapse, and how to handle or make the patients calm when they are in an aggressive state.

The following extracts illustrate the above stated problem:

“I don’t think you get much information here, but when I belong to the club, the doctor used to come and inspect us and share very important information about mental illness. But ... otherwise I can’t say that the information given here has helped.” (X12)

“... the service is very poor and had no information, nobody explains anything to you. If you don’t help yourself, you are going to get nowhere, you tend to be like a dummy. You want to know the side-effects of the medication ... There is very little help offered, are you with me? For people who have mental illness that are put on medication and left alone.” (X7)

Furthermore, participants were of the view that in order to resolve the problems highlighted above, there is a need for more staff and facilities that could improve patient and healthcare providers' relationship and sharing of information that helps the clients.

In summary, the participants expressed their dissatisfaction with the current mental health service delivery. The shortage of health facilities and health workers appears to contribute to the long waiting times and short healthcare consultations with health workers. It can be noted that waiting for too long at each service point is stressful and frustrating for people seeking help, particularly for those with mental conditions. It is also important to note that providing adequate consultation time and information sharing has a therapeutic effect for people with psychological problems.

4.6.2 Mental health education and information at health facility

The participants expressed that mental health education and information sessions in the patient waiting area in the CHCs are not effective. Mental health has a broad spectrum, meaning that there are many types of or categories of mental illness, that makes it difficult to provide health education and information sessions about it.

The following are extracts from the data:

“Health education in a big group in a waiting area is not working, because nobody is listening or keeping quiet.” (X9)

“You find some of us are listening but everybody else eventually starts to talk, and it does make me mad because I think it's so rude. You know, even if they don't want to listen they should keep quiet.” (X13)

The participants reported that the best place for mental health education and information sharing would be from the sister during the consultation time. The following quote illustrates this:

“The sister should provide health education and share information about mental illness, because a lot of people, every patient would prefer the privacy, so they prefer the health education in the doctor or nurse's office rather than in the waiting area.” (X8)

They added that even nurses or doctors cannot manage to stand and talk to the group in a waiting area, as it is always too noisy and people are not interested in listening to other people's health problems. However, some participants stated that more time for the patient and a bit of health education upfront is important. Others suggested that even information on pamphlets which are sometimes handed to the patients or caregivers could help, but they haven't seen any pamphlets.

In summary, the mental health information session in a waiting area does not seem to be effective in promoting mental health. A one-to-one session with the doctor or nurses and handing out information pamphlets may be the best way of sharing information. However, based on the evidence identified in this study, nurses and doctors are already overwhelmed by their workloads and the complexity of the medical problems. It would be a challenge for them to have to take on the responsibility of information sharing without addressing the major barriers such as the shortage of clinical staff and lack of resources.

4.7 Findings from document review

In this study paper-based document analysis was carried out at three CHCs to determine how patient information has been recorded, processed, disseminated and utilized. It also analysed the presence of the data, timelines, readability, consistency, clarity, quality, completeness and its authentication or validation of the record for its correctness. Little has been researched about paper-based patient record systems and the associated advantages.

In most cases a document review is a process for assessing the quality of clinical records, which includes all of the components of the records: medical notes, nursing process, referrals, discharge summary and treatment charts, patients' results and reporting system. However, the purpose of this document review for this study was mainly to supplement the findings of the interviews with information. Therefore, it is by no means adequate enough to make conclusions based on the analysis of this document review alone, because of the small samples and the fact that it was not a comprehensive document review. Assessment of the documents includes information recorded in the register book, daily tally sheets, RMR form and feedback report.

Emerging themes from the document analysis were similar to those from the interviews. Three main themes emerged: lack of standardized data collection tools for recording and reporting; lack of accuracy and consistency of information capturing and processing; and information validation, reporting and feedback.

4.7.1 Lack of standard data collection tools

The result of document analysis has shown that there were no standardized data collection tools at district health service levels. It was observed that the data collection tools changed often, which created confusion and duplication between the old and new tools. Some facilities used the old information tools because they did not receive the new one or did not know how to use the new one, and others used both the old and the new. Others developed their own daily and weekly tally sheets to suit their purposes. This shows that there was no uniformity in the distribution of data collection tools and updating of information with new data collection tools. However, the RMRs are the tool that is common to many facilities.

No written instructions were found on how to use the new tools nor any orientation to the new tools. According to the WHO (2005b) the principles of information collection tools should be developed from simple to complex, meaning starting with simple data collection and processing tools and then gradually increasing complexity as necessary. What was observed in the document review was the opposite: the monthly RMR data collection tools were originally designed to collect a lot more information than the current one. For example, tools originally designed to collect about 12 elements of mental health information were gradually reduced down to one element. At the time of this document review there was only one element, i.e. number of mental health visits had been collected for reporting.

The register books and tally sheet information collection tools are mostly used by the clinical staff, whereas the RMR information recording tool is used by the information clerks. Every new year all active information on the old register book is transferred to a new register book, but in some cases only half or three-quarters of the information was transferred. The information recorded in the register book had not been used for reporting; no one uses it for any purpose except for some form of track record and patient follow-up. Most information was recorded in the register book as a matter of routine. The type of patient information recorded in the register book was mainly the socio-demographic and geographical characteristics of the patients and diagnoses in ICD10 format. Information recorded in the daily tally sheets are used for reporting, and information recorded on the daily tally sheets is transferred to a weekly tally sheet. Tally sheets are prepared by the district health facility; some prepare their own, but the contents the form carries are mostly similar to those on other tally sheets.

As stated in the interview results, the problems with the quality of recording and processing of information may be linked to difficulty in understanding the frequent changes of tools as no written instructions or orientation was given to them about how to work with the new tools. It could also be linked to the negligence or attitudes of management staff in terms of developing standard tools and providing instruction or orientation on how to use the new tools.

4.7.2 Inaccuracies and inconsistencies of information recording and processing

The findings of the document review showed that there were inaccuracies and inconsistencies in capturing and processing information. These discrepancies and inaccuracies in capturing the information were observed among some of the information officers and clinical staff.

Some of the records could not be read because they were negligently written, lacked clarity and had incomplete sentences. Others were scratched across the forms, or had a line across the form, but no clarification was given as to what that meant. Some inaccuracies were created during transfer of information from one form to another. There were so many blank spaces and incomplete information in the register books that it seems that there was inconsistency in recording and transferring information.

In some cases, non-standard abbreviations were used, and some could not be understood. The recording of patient information did not reflect good standards of documentation practices and principles. The patient information recorded was still of poor quality, with inconsistencies and fragmentation of recording. The documentation did not provide an accurate picture of the care and treatment provided.

Data analysis and utilization were not practised at the DHIS. For example, it was stated in the interview findings that there was a lack of knowledge and skills in data analysis and presentation among many information officers; however, as reported earlier in the interview findings, data analysis was not part of their job description. Thus it was common to find huge amounts of recorded patient information piled up for years without ever having been used. As also stated, the amount of mental health information being collected was very limited. The findings of the document review revealed that lack of quality information collection and processing seems to be a common problem.

4.7.3 Information validation, reporting and feedback

Statistics South Africa has developed a South African Statistical Quality Assurance Framework which consists of eight dimensions of data quality. The national DoH has adopted

these dimensions with some modification in order to ensure the quality of the DHIS: relevance of data, integrity, timeliness, accessibility, reliability, completeness, accuracy and coherence and compatibility (DoH, 2011). Authentication of the patient record for case management and prescription was mostly done by psychiatric nurses and sometimes by a consultant psychiatrist. Trends in the documents show that there are signatures on the reported documents. The authentication of the RMR was done by the facility manager for its correctness. Documents were not grouped according to their category, such as referral notes, tally sheets, and discharge summary report forms.

Although the national DHIS policy stipulated that there should be quarterly feedback to sub-district and health establishments with regard to how they compare with their peers on data quality and performance level in terms of achieving the targets, no feedback documents were found at the health facilities. The documents reviewed reflected that there was a bottom-up reporting system, but results of information analysis of the report had not been sent back to the health establishment for action or achievement rewards. It was also stated in the DHIS policy guidelines that apart from the formal feedback channels mentioned above, monthly informal feedback must be provided to relevant stakeholders on observations in terms of data quality and optimization of data management and process (DoH, 2011). Therefore the level of dissemination and utilization of mental health information was very low in the decision-making process.

In summary, most of the information recorded was not for reporting purposes, and there was no standard procedure for validation of information collected and processed. Although the information for reporting is supposed to be checked for discrepancies or inaccuracies, the document was signed as checked, with errors and discrepancies. Several documents reviewed indicated that there was incorrect information sent to substructure office and sent back for correction. Documentation review in this section indicated that validation of the information

was superficial, and no feedback found in terms of analysis of the information at provincial and national level.

4.8 Summary of key findings

This chapter presented analysis of the empirical findings in phase one. A summary of these key findings is presented, and links are created to central themes from all other findings. Accordingly, five problem areas have been identified for intervention through a framework to address them, which this study sought to create.

The five identified problem areas are: (1) standardised information collection tools and contents; (2) information infrastructure; (3) information processing, output and outcome; (4) information competency; and (5) availability of resources.

The following figure indicates the relationship of the identified key areas to the DMHIS.

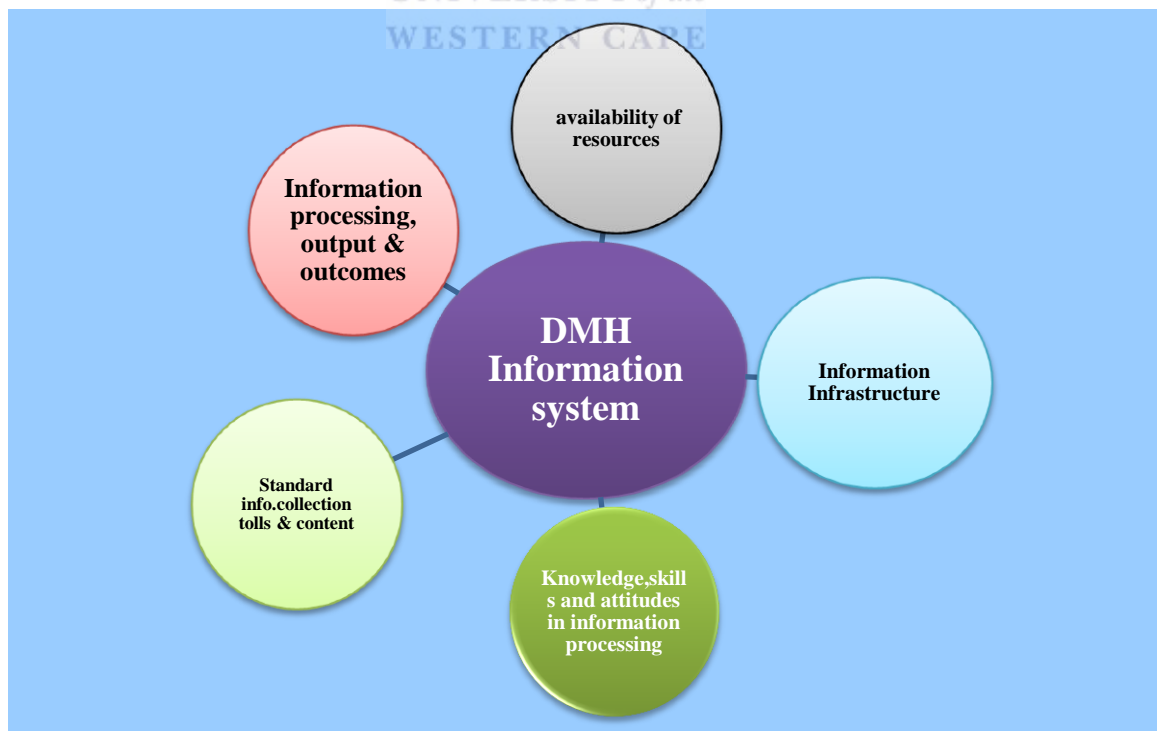


Figure 4.1: Relationship of identified key areas to the DMHIS

4.8.1 Lack of information collection tools and contents

Information collection tools and contents include two subthemes from professional groups – ‘information collection tools and information content’, and one from both the document review and professional interviews – ‘lack of standardized information collection forms for mental health’. It was realised that the information collection tools and information contents for district mental health services are not yet standardized. Moreover, there is no minimum data set for mental health information collection in the district health system. Therefore the current mental health information reported to a higher level is not adequate for decision making and planning of effective mental health services.

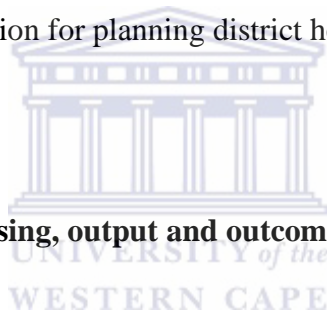


4.8.2 Information infrastructure requirements

The information infrastructure is defined by Hanseth and Lyytinen (2004: 208) as “a shared, evolving, open, standardized, and heterogeneous installed base”, and by Pironti (2006) as all of the people, processes, procedures, tools, facilities and technology which support the creation, use, transport, storage and destruction of information. Since the 1990s the notion of information infrastructure has improved and has been quite fruitful in the information system field.

In this study information infrastructure is one of the main themes that emerged. The following three subthemes are linked to this main theme: manual information processing, electronic information processing and networking, and systems for information analysis and utilization.

There is a lack of adequate skilled human resources to work with the new technologies available. Besides that, technology such as computers, software, and Internet access for information collection and analysis and dissemination are either inadequate or not readily available. Furthermore, the information flow policy is not known by mental health nurses, and this affects efficiency in the process of information flow. While smooth and fast information flow is critical for facilitating the communication of patient information between health facilities, health authorities and the community; the manual-based information communication (flow) between health facilities was reported to be too slow to help with patient problems timeously. Effective electronic information communication is not adequately available. The information infrastructure is critical to process, analyse, communicate and utilize information for planning district health services.

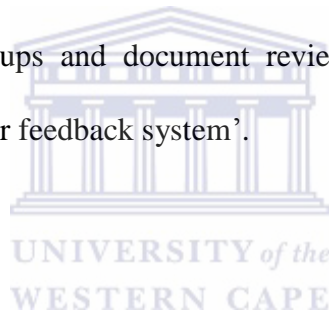


4.8.3 Poor information processing, output and outcome

There was a major gap in information processing in the district health services. The problems of information processing were commonly shared by all study participants. The study identified that there are inaccuracies and inconsistencies in capturing and processing patient information. Poor-quality information processing and outcomes have an impact on health care, and affects planning, budgeting and taking preventive and promotional actions. The quality of data is ensured by data accuracy and validity of the original sources of data; reliability; completeness; legibility; currency; accessibility; meaningfulness/usefulness; and confidentiality and security of information to patients and for legal matters. However, the study showed that the quality of data suffers from lack in all the abovementioned components or elements of criteria for quality of information.

The quality information theme links to other themes that emerged from individual interviews with caregivers and document review. These themes are ‘lack of appropriate information about the illness’ and ‘inaccuracies and inconsistencies of information capturing and processing’ respectively.

The information validation process in the DHIS was conducted by the facility manager. However, there were no structured and proper criteria for this process. There are many small themes linked to this central theme of information processing which includes one theme from the FGDs – ‘lack of support and inadequate information sharing’, and two themes from individual interviews with caregivers – ‘client waiting time and quality of services’ and ‘mental health education information sharing at health facility’. A similar theme emerged from professional interview groups and document review: ‘lack of standard criteria for validation of information and poor feedback system’.



4.8.4 Lack of competency in information processing

Competency refers to the knowledge, skills and attitudes of people in a particular subject. It is a powerful tool to run an effective and efficient DHIS. In an information system, whether big or small, well established or not, how competent a person is determines the quality of information processing.

The findings of the study identified that there was a lack of competent persons in information processing due to a lack of human resources development. Many staff involved in district health information collection and processing do not have the understanding, skills and attitudes relating to the importance of information. This resulted in poor information capturing, processing and utilization. No training was offered at higher training institutions

for medical and nursing students, or at in-service training programme/career development. There is therefore a need for training of all health personnel in the DHIS and promoting career development. This theme links to the shortage of human resources which emerged from individual interviews with caregivers, and information infrastructure.

4.8.5 Limited availability of resources

The findings identified that lack of resources is the main challenge being experienced. Most participants indicated that unavailability of computers and staff computer illiteracy are barriers to collecting and processing quality information. Shortages of staff and the manual recording system were also mentioned as major barriers to capturing and processing patient information. These also affected the patient consultation time, which is usually too short for meaningful consultation or sharing of specific information. In addition no adequate information or skills were provided to the caregivers on how to care for and handle a person with mental problems.

This theme also linked to other subthemes that emerged from individual interviews with caregivers, and from the professional group interviews: shortage of staff, lack of technical and human resources, lack of information infrastructure and inadequate knowledge, skills and attitudes. The information systems are like a network, whereby if one network fails the rest of the networks are incomplete and unable to process effective work.

Table 4.2 summarises the identified subthemes and their links to their respective central theme.

Table 4.2: Summary table of the key findings

Subthemes	Central themes
<ul style="list-style-type: none"> • Lack of standardized information collection tools • Frequent change of information collection tools • No minimum data set for district mental health information • Current district mental health information reporting is not adequate for decision making • No report on patient socio-demographic characteristics and diagnosis • Headcount reporting 	<p>Standardised information collection tools and contents</p>
<ul style="list-style-type: none"> • Lack of IT • Lack of skilled personnel • Unclear information flow policy • Lack of coordination of vertical and horizontal information flow • Lack of a system for information analysis and utilization • Manual information collection and processing • Lack of computer and networking 	<p>Information infrastructure</p>
<ul style="list-style-type: none"> • No structured criteria for information validation • Lack of top-down feedback system • Shortage of staff affects the quality of information processing • Lack of adequate and appropriate information sharing with patients and caregivers • Clients' long waiting time for services and poor-quality services, service dissatisfaction • No information audit system • Inaccuracies and inconsistencies in capturing and processing information • Poor-quality information affects health planning, budgeting, preventive measure and promotional action of the mental health community • Unreliable and incomplete information 	<p>Information processing, outputs and outcomes</p>

<ul style="list-style-type: none"> • Lack of trained, competent personnel in information collection and processing • Lack of technical and human skills development • Lack of computer literacy programme • Poor information capturing, processing and utilization 	<p>Computer literacy and knowledge, skills and values in information processing</p>
<ul style="list-style-type: none"> • Lack of financial budget • Lack of human and technical resources • Load of work due to shortage of health workers • Unavailability of computers 	<p>Human, technical and financial resources</p>

4.9 Phase two: Findings from the systematic review

This section presents the findings from the systematic review. The systematic review research questions were developed out of the findings of the phase one study.

The systematic review was guided by the following main review question:

1. What are the successful functional elements/models/frameworks for a district/community-based MHIS?

Sub-review questions:

1. What are the technical and organizational structures required for district/community mental health information infrastructures?

2. What are the information collection tools and contents required for district/community mental health services?

3. What is the infrastructure required for collecting and processing mental health patient information?

4. What are the information competencies required for a district/community MHIS?

As illustrated in the previous chapter, due to the fact that very limited research was found in the study area, the initial systematic review questions were changed to widen the scope of the search. The studies in MHISs in developing countries are very scant, and this made the search more challenging. The focus of the research question was gradually changed from district mental health information to MHISs, but did not yield relevant articles within the scope of this study. Then the search terms were changed to ‘health information systems’. The following search terms were used: health information systems framework/guidelines, health information infrastructure, information tools and information contents, health information competency; information processing and quality of information. However, the question on minimum data set was specific to mental health.

All relevant databases were searched to retrieve as many studies as possible. The following diagram illustrates the screening process of the study papers identified through searching different databases. The independently extracted data were compared with the help of another independent reviewer who assisted with the review process of this part; experts were also consulted for the methodological rigour of the review process. Discrepancies were resolved through consensus.

Figure 4.2 illustrates the screening process of the systematic review.

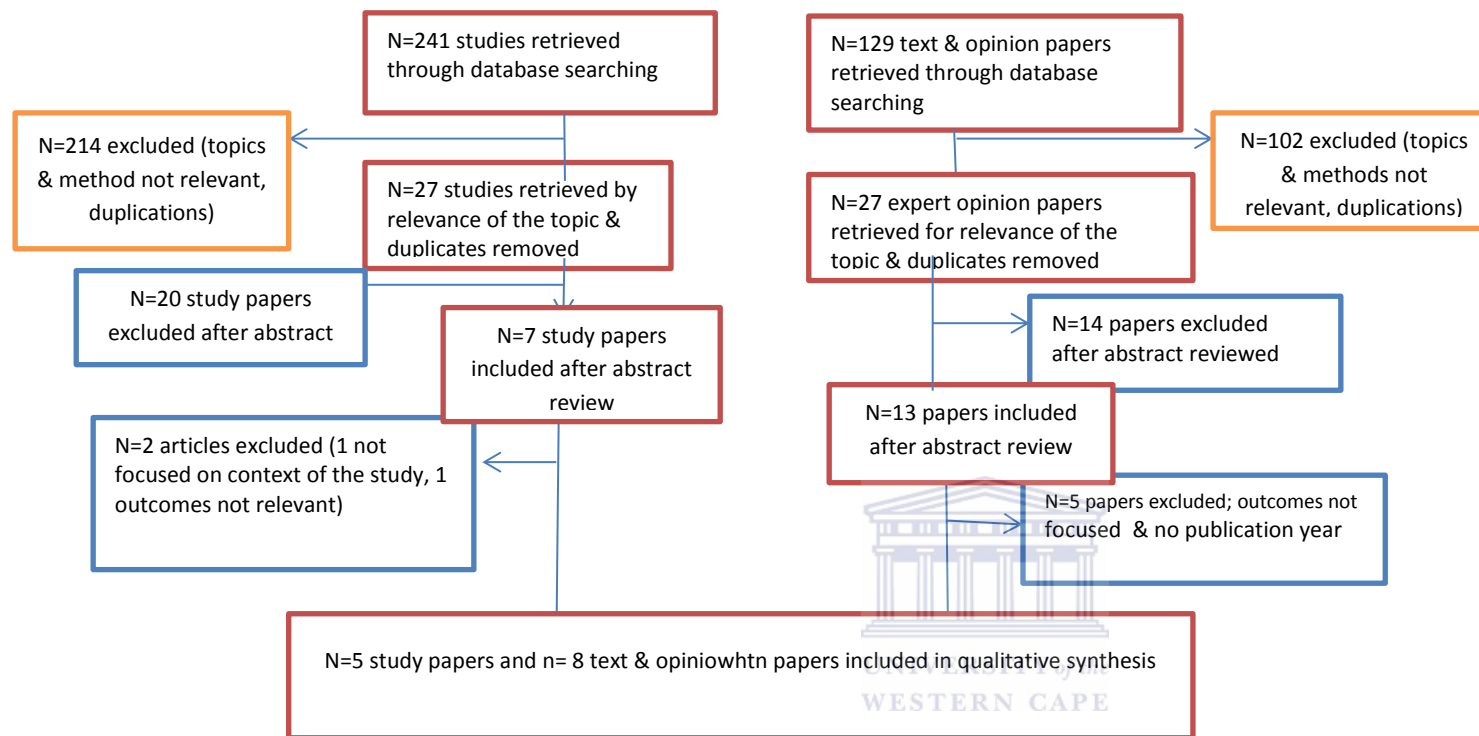


Figure 4.2: Screening process to select studies

The search included descriptive survey studies such as cohort studies, cross-sectional studies, randomized control trials, quasi-experimental studies, and qualitative studies such as interviews, FGDs, case studies, workshops, consensus studies, key informant interviews and observational studies. The study was also designed to include expert opinion papers, government policy guidelines/papers and conference proceedings on HISs. Additionally, the study involved material on/by healthcare professionals, information officers, health managers, health information experts, patients, relatives and mental health nurses. All geographical locations were included in the search, although the focus was mainly on developing countries. Studies on health facilities such as PHC centres, district/CHCs, public and private hospitals and clinics were included in the search.

A total of 370 papers were cited. Applying the inclusion and exclusion criteria systematically produced 27 research papers and 27 text/opinion papers were retrieved after abstracts were reviewed. Screening the articles with a full review reduced them to 20 study papers. Of the 20 articles selected for critical appraisal, 13 were texts and expert opinion papers and 7 were research papers.

The Leindner and Kayworth (2006) systematic literature review method used in Okoli and Schabram's (2010) guidelines for critical appraisal in information systems was used for research-based papers. The JBI (2011) critical appraisal criteria for qualitative study papers and text and expert opinion papers were used to assess them. The studies and guideline papers included were discussed with the research supervisor and co-supervisor and consensus was reached.

4.9.1 Studies informing the context of MHIS framework development

As indicated earlier, one of the objectives of this study was to gather information by conducting a systematic review. Gathering functional elements through systematic review was the foundation of developing the framework as an intervention for the problems identified in phase one of this study. As indicated earlier, five key findings were identified by this study as an intervention for establishing a DMHIS.

Research on mental health information is very scarce in developing countries, and thus very scanty literature was yielded related to the context of this study. The scope of the search terms was modified from district MHIS to MHIS, and a few articles were retrieved; however, most were not related to the context of the study. Therefore, the scope of the search term was widened from MHIS to HIS, and some qualitative research-based papers and more non-research-based papers were retrieved. The non-research-based papers (text and expert opinion) included the development of HIS guidelines, government policy on health information, and consensus and workshop papers. The JBI criteria checklist was used for critical appraisal of both qualitative research-based papers and non-research-based papers. According to JBI's qualitative research paper critical appraisal criteria, those papers that scored eight and above out of 10 can be accepted for further review and data extraction; similarly, those text and opinion papers scoring 5 or 6 and above out of 7 can be accepted for further review and synthesis.

4.9.1.1 Critical appraisal criteria for qualitative research findings

The researcher used the JBI-Qualitative Assessment and Review Instrument (QARI) critical appraisal criteria to select the relevant qualitative research findings. The criteria has ten assessment points, and each assessment point is answered yes, no or unclear. The score calculated out of ten by counting “yes” answer.

Table 4.3: Criteria for critical appraisal of qualitative research findings

	Criteria	Yes	No	Unclear
1	There is congruity between the stated philosophical perspective and the research methodology			
2	There is congruity between the research methodology and the research question or objectives			
3.	There is congruity between the research methodology and the method used to collect the data			
4	There is congruity between the research methodology and the representation and analysis of data			
5	There is congruity between the research methodology and the interpretation of the results			
6	There is a statement locating the researcher in the research and vice versa			
7	There is influence of the researcher on the research			
8	Participants and their voice are adequately represented			
9	The research is ethical according to current criteria or for recent studies there is evidence of ethical approval by an appropriate body			
10	Consensus drawn in the research report appears to flow from analysis or interpretation of the data			

4.9.1.2 Critical appraisal of qualitative research findings

The critical appraisal of the qualitative research findings was conducted as shown in the table below to assess the level of evidence based on the criteria designed by JBI for qualitative research findings.

Table 4.4: Critical appraisal of qualitative research findings

Criteria											
Authors	1	2	3	4	5	6	7	8	9	10	Score
Chetley <i>et al.</i> , 2006	Y	Y	Y	Y	Y	N	Y	U	Y	Y	8
Cline & Luiz, 2012	Y	Y	Y	U	Y	N	Y	N	N	Y	6
Odhiambo-Otieno, 2005	Y	Y	Y	Y	Y	U	U	Y	Y	Y	8
Littlejohn, Wyatt & Garvican, 2003	Y	Y	Y	Y	Y	U	Y	U	Y	Y	8
Hendy, Reeves, Fulop, Hutchings, & Masseria, 2005	Y	Y	Y	Y	Y	U	U	N	Y	Y	8
Garrib <i>et al.</i> , 2008	Y	Y	Y	Y	Y	U	U	Y	Y	Y	8
Morris <i>et al.</i> , 2010	Y	Y	Y	Y	Y	N	U	Y	U	Y	7
Vital Wave Consulting, 2009	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	9

Key: Y= yes; N= no; U= unclear

In the JBI- QARI critical appraisal criteria the qualitative research findings that scored more than 8 points and above out of 10 can be accepted. However, it varies from researcher to researcher. Some researchers accept papers scoring 9 or more out of 10; others accept 7 or more out of 10. Therefore, for the purpose of this study, those papers which scored 8 and above were accepted for further review and synthesis. Based on the critical appraisal criteria, 2 papers were excluded out of 7 study papers, and the remaining 5 study papers were accepted for data extraction and synthesis.

4.9.1.2.1 Exclusion and reason for excluding some study papers

Among the research-based papers eligible for critical appraisal assessment (N=7) (Table 4.9), only 5 articles were selected for theme extraction and synthesis, and 2 articles were excluded from further review. The reason for exclusion of the two articles is as follows. Morris *et al.* (2010) conducted a study to evaluate the validity and reliability of the newly developed hospital-based Irish nursing minimum data set for mental health and to ensure its clinical usability. The study was conducted in a developed country and was a hospital-based study. The article was excluded from further review and data extraction because firstly, it is a hospital-based study and not applicable to the context of this study, and secondly, the paper did not meet the critical appraisal criteria on more than two critical points, such as locating the researcher in the research and the researcher's influence on the research, and furthermore the outcomes were not applicable to the developing countries context of the study.

Cline and Luiz's (2013) study identified different perceptions among doctors, nurses and administrative staff about the impact of automation systems in hospital services delivery. The study revealed that there was resistance to the adoption of automated systems by the doctors

compared to nurses. However, the findings were based on a hospital study with minimal relevance to the context of this study, where the effects of doctors are not as significant as those of nurses at district/PHC level. In addition, the researchers' roles in the research and participants' voice were not clearly addressed. Therefore, the study did not meet the criteria for extraction of the theme and synthesis.

4.9.1.3 Data extraction from qualitative research papers

Data extraction from the qualitative research papers was conducted as it is shown in the following table at page 191.

Table 4.5 outlines the extraction of data from the five selected research papers.



Table 4.5: Data extraction from research papers

Citation	Methodology	Purpose	Sampling method, sample size/ setting	Relevant findings	Recommendation
Chetley <i>et al.</i> , 2006	Key informant interview, online discussion	To explore and identify constraints in using ICT effectively in health sectors of developing countries, identify good practice and good stakeholders/ players and highlight the priority needs and provide recommendations on priority issues	No sample size indicated for key informants interviews and discussions with online participants	Eight main constraints and challenges were identified in developing countries: connectivity, content, capacity, community, commerce, culture, cooperation and capital. 12 key lessons are evident in the development of ICTs. Technology is not an end in itself, but a tool to enhance existing work and achieve a broader health system; it is dependent on the active involvement of beneficiaries and end users; determined by local conditions; technology should be user-friendly and sustainable; no single technology will be suitable for all situations so combine old and new ICTs in creative and innovative way; capacity development training; international multi-stakeholder partnerships; enabling environment; monitoring and evaluation; sharing learning and dissemination; addressing the need of the poor, and clear plan for sustainability ensures capital for	To keep the ICT simple, relevant and local. Build on what is there and being used; involve users in the design by demonstrating the benefits; strengthen monitoring and evaluation; it should be participatory, share learning about what works and what does not, improve communication strategies in the design of information systems

				infrastructure requirements	
Hendy <i>et al.</i> , 2005	Case studies and in-depth interviews	To explore and describe the context for implementing the national program for IT (NPfIT); actual and perceived barriers and opportunities to facilitate implementation	Sample size, 23 senior managers and clinicians	Various circumstances affected the ability to implement NPfIT; process of implementation was suboptimal, low morale in the National Health Service (NHS) staff responsible for implementation; resistance to change; lack of trust about the implementation schedules, short-term benefits alone are unlikely to persuade NHS staff and some experience loss of electronic functionality in the short term, and poor coordination and communication	The national programme managers prioritise strategies to improve communication with and to gain the cooperation of frontline staff. The importance of socio-cultural consideration in the implementation of IT
Odhiambo-Otieno (2005)	In-depth interview,	To evaluate the extent to which existing information systems have supported the operational management of health service at district level	Purposive sampling; sample size in this study was n=33. DHIS; 3 Districts in Kenya	The study shows that the DMHIS design was done at Ministry headquarters ignoring both those who were to eventually operate them and use the system. There were marked differences in the focus of health workers and DMHIS staff. Inadequate supply of basic necessary resources, lack of integration, no effective central coordination, fragmented; no mechanism for sharing of information among stakeholders, large amount of data collected was sent to higher level for analysis and not used at service point. DMHIS remains the weakest link in their design, implementation and operation	Recommended that for the effective management, the design of DHIS should involve stakeholders and integrate data from all health service providers and for sustainability issue. Ensure participation of all key stakeholders, developer, the user and the patients in the development of DHIS Infrastructure and functioning organizational & health system for implementation of new technology, users' understanding of implementation of new system,
Garrib <i>et al.</i> (2008)	Semi-structured key informant	To evaluate the implementa-	Convenience sampling; key informant	High perceived burden of data collection and collation was found. Duplication of data collection in all	Education and skills training for healthcare worker and managers on data analysis, interpretation, and

	interviews and document record analysis	tion of the DHIS in rural South Africa	interviews with 10 rural clinics. Setting in KwaZulu-Natal, South Africa	clinics, as several separate registers existed for data collection and the format and availability of these registers differed from clinic to clinic. Tools, e.g. tally sheet poorly used, because poorly designed and lack of time. 7 out of 10 clinics reported that collation of data takes 2days/month for 1 staff member; other clinics stated that it would take between half a day and a full day. Data missing: almost no feedback, little or no analysis, interpretation or utilization. Poor skills, high staff turnover, lack of understanding of indicators and poor numeracy skills among healthcare worker and managers affected the data utilization	data set concept development on data utilization and support and understanding of indicator could avoid duplication and improve data quality. Computer and numeracy skills and standardised designed data collection tools
Vital Wave Consulting (2009)	Interview, case studies and secondary data analysis	To conduct a landscape analysis of HIS development in developing countries	Multi-country case studies	The study identified 5 categories of HIS development, where stage 1: represent those countries with only manual data collection and reporting system; huge, redundant and poor quality of data; stage 2: data collection and reporting is based on manual. Collect smaller set of data with a view to produce quality data, no integration with other information; stage 3: Data collection is based on both manual and electronic DHIS but no change to process of compiled reports and poor quality data and fragmented system; limited computer literacy; stage 4: represents a significant shift to HIS. Electronic data captured in course of	The study provided the following recommendations: consensus adaptation of a minimum set of essential indicators to determine the common, essential information needs and sustainable resources to enhance HIS success; defined HIS needs and goals, streamline data collection; manual data collection and reporting; electronic data capture and reporting system, quality data processing, develop HIS to support decision making; plan for

				<p>routine transaction. Users access right to health data and sustainability issues in rural areas; stage 5: represents a comprehensive national HIS in all areas and fully integrated system that is adaptable and sustainable, strong government support and a clear responsive policy and regulation; culture of evidence-based decision making.</p>	<p>project operation and maintenance; invest adopted technology; increase project accountability; and invest in increasing attractiveness of HIS technology and services</p>
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4.9.1.3.1 Included articles for theme extraction and synthesis

The study by Chetley et al. (2006) was aimed at policy makers involved in the development and management programme in the health sector in developing countries. The study addresses the type of ICT intervention relevant to use in the health sector in developing countries. The policy debate around ICTs and health focuses on the identifying the most effective and relevant use of ICTs. There has been an international agenda about the potential use of ICTs to improve the health and well-being of the poor and marginalised, combating poverty and encouraging sustainable growth and governance. The study indicated that ICTs have the following major impact on the healthcare industry: improving the dissemination of public health information and facilitating public health discourse around major health threats; enabling remote consultation, diagnosis and treatment; facilitating collaboration and cooperation among health workers, including sharing of learning and training approaches, supporting effective health research and dissemination of and access to research findings; strengthening the ability to monitor the incidence of public health threats and respond in more timely and effective ways; and improved efficiency of administration systems in healthcare facilities.

The study concluded that the use of ICTs in the health sector should be relevant to the local context and need; building on what is already there and being used; involving users in design and demonstrating benefit; strengthening capacity to use; improve monitoring and evaluation; include communication strategies, and sharing information and learning about what works and what does not. However, the complexity of putting them into practice is one of the biggest challenges to ensure health system benefit; health worker benefits; and that the patients and citizens benefit and their health improves.

Odhiambo-Otieno (2005) used interview and FGDs to evaluate the design and performance of DHIS, and identified that the design of DHIS did not involve the users (it was designed at Ministry of Health level). Ignoring involvement of the actual actors/operators and users of the system resulted in poor performance of the DHIS. The study indicated that there was poor infrastructure, lack of integration, lack of involvement from health managers and health workers, and poor data collection and utilization of information at local level, with no feedback. The DHIS was found to be the weakest link in the health system. The results of the study emphasized the importance of involving the health facility managers, health workers and stakeholders in the design and development of the DHIS. Similar to other countries' experiences, a top-down structure of information system is rarely successful. Although the authors use a small sample to conduct the study, the findings indicate that the development of a framework for a DMHIS should involve the stakeholders, users and community.

A study by Hendy et al. (2005) suggested that trust in IT development affects the ability to implement the IT. The morale among the health staff, timetable for implementation and trust over IT are key issues for successful implementation of IT in the health sector. Furthermore, optimal delivery of IT depends not only on technical capability, but also on managing implementation so that staff embrace the IT changes with enthusiasm. The study recommended that the national health programme should prioritise the implementation of IT. Managing changes in working practices, technical performance and involvement of the senior managers are also crucial for IT implementation.

Garrib *et al.* (2008) used key informant interviews at 10 rural health clinics and 12 months' document records to evaluate the DHIS. The findings of the study were comparable with the results of this study. The recommendations of the study have important scientific grounds for developing the intended framework. Relevant skills training for healthcare workers and health managers on data analysis, interpretation, and data set concept development for data

utilization and support as well as developing an information culture are fundamentals of DHISs. Furthermore, the studies highlighted that the collection of data that reflects the needs of operators and users as well as the understanding of indicators could reduce the duplication of data collection and improve data quality.

Vital Wave Consulting (2009) conducted multi-country case studies and analysis of secondary data on the development of HIS in developing countries. According to the analysis, South Africa was categorized under stage 3, where HIS use both manual and electronic data collection and processes. A brief description of the five stages of HIS development in developing countries was given in the Table 4.5. The findings of the studies and recommendations forwarded are relevant to this study. It provides the scientific grounding for the development of a framework for DMHIS, and therefore, the article was included in the study for data extraction and synthesis.



4.9.1.4 Concept identification

The following functional concepts were identified from the above research-based papers' data extraction. The key concepts are developed from the categories of concepts (Table 4.6).

Table 4.6: Findings from qualitative systematic review papers

Concepts extracted from systematic review of qualitative research papers	Key concepts developed
<ul style="list-style-type: none"> • Organizational factors impact on technology development • The need for change of management function • Technical resources • Functioning health system • Sustainable resources to enhance HIS development • Health investment • Project operation and maintenance • Project accountability • Management of high health staff turnover • Monitoring and evaluation system 	Functioning organizational environment and resources

<ul style="list-style-type: none"> • Adapted technology development • Electronic health recording and processing • Develop HIS for decision making • Integrated HIS • Transferring manual to electronic information processing 	Health IT development
<ul style="list-style-type: none"> • Involvement of health information policy makers • Involvement of practitioners • Users and patient involvement • Essential health information needs • Involvement of IS developers • Participation of key stakeholders 	Community and stakeholders' involvement
<ul style="list-style-type: none"> • Behavioural - knowledge, skills, attitudes and values • Users' understanding of implementation of new system • Understanding social and health culture • Increased visibility of mental health nurses • Skills training for health workers and health managers on data analysis, interpretation and utilization • Computer and numeracy literacy among health workers and managers • Understanding indicators 	Improving staff knowledge, skills and attitudes in information system
<ul style="list-style-type: none"> • Minimum data set for DMHIS • Consensus adaptation of minimum set essential indicators at national and provincial level • Streamline data collection • Standard information collection form • Quality data processing • Data analysis, interpretation, feedback and utilization 	Standardised information collection form and contents, and quality of information processing and utilization

4.9.1.5 Critical appraisal criteria of text and opinion papers

The researcher used the JBI critical appraisal criteria for text and opinion papers to assess the level of evidence of the text and opinion papers (Table 4.7).

Table 4.7: Criteria for critical appraisal of the text/expert opinion papers

	Criteria	Yes	No	Unclear
1	Is the source of opinion clearly identified?			
2	Does the source of the opinion have standing in the field of expertise?			
3	Is the interest of the patients/clients the central focus of the opinion?			
4	Is the opinion's basis in logic/experience clearly argued?			
5	Is the argument developed analytically?			
6	Is there reference to the extant literature/evidence and any in congruency with it logically defended?			
7	Is the opinion supported by peers?			

In the JBI- NOTRI critical appraisal criteria the text and opinion papers that scored more than 5 or 6 points out of 7 can be accepted. However, this varies from researcher to researcher. Some researchers accept papers scoring 5 or more out of 7; others accept 6 or more out of 7. For the purposes of this study, text/expert opinion papers which scored 6 and above were accepted for data extraction and synthesis. Based on the critical appraisal criteria, 5 papers out of 13 were excluded, and the other 8 text/opinion papers were accepted for data extraction and synthesis.

4.9.1.6 Critical appraisal of text and opinion papers

The critical appraisal of the text and opinion papers was conducted as shown in table below to assess the level of evidence based on the criteria designed by JBI for text and opinion papers.

Table 4.8: Critical appraisals of the text and opinion papers

Criteria								
Authors	1	2	3	4	5	6	7	Score
WHO, 2008	Y	Y	Y	Y	Y	Y	U	6
RHINO, 2006	Y	Y	Y	Y	Y	Y	Y	7
Ammenwerth <i>et al.</i> , 2004	Y	Y	Y	N	U	N	U	3
Aqil, Lippeveld & Hozumi, 2009	Y	Y	Y	Y	Y	Y	U	6
Ranck, 2011	Y	Y	Y	U	Y	N	N	4
Hozumi & Shield, 2003	Y	Y	Y	Y	N	U	Y	5
Health and Social Care Information Centre, 2012	Y	Y	Y	Y	Y	Y	Y	7
Australian Institute of Health and Welfare, 2012	Y	Y	Y	Y	Y	Y	U	6
WHO, 2005 b	Y	Y	Y	Y	Y	Y	Y	7
DoH, 2011	Y	Y	Y	Y	Y	Y	U	6
WHO, 2004 b	Y	Y	Y	Y	Y	Y	U	6
Sharma, 2012	Y	Y	N	Y	U	Y	N	4
Petter, DeLeon & McLean, 2008	Y	Y	N	Y	Y	Y	U	5

Note: Y = yes, N = no, U = unclear. Criteria 1-7 are the critical appraisal tools. Articles scoring 6 or more out of 7 were included in the synthesis.

4.9.1.6.1 Articles excluded and reason for exclusion

A study by Sharma (2012) was based on the previous work experience and analysed the secondary evidence for developing a user-centred design framework for a public HIS. The author did not find adequate studies for analysis in the specific context of the study. For this reason, the outcomes of the study suffered from lack of supporting evidence and required more studies to be explored and analysed in order to develop conclusive remarks. The result of the study as it appeared was not conclusive to develop a user-centred design framework for a public HIS system.

Ammenwerth, Brender, Nykanen, Prokosch, Rigby and Talmon (2004) conducted an expert workshop with 23 participants from European countries to evaluate HIS in order to identify and address the problems and promote transdisciplinary exchange with evaluation research and promote European cooperation. Based on the findings of the evaluation, 12 recommendations were outlined with regard to evaluation of HIS. The workshop concluded about setting up a network of European scientists working on evaluation of HIS and synergy to combine the research traditions from different evaluation fields, leading to a new dimension and collaboration on further research on information system evaluation. Thus, the focus of the evaluation workshop was on developed countries' HIS and the context is not related to developing countries' needs and requirements. The focus of this study was to develop a framework for DMHIS in resource-limited settings. Therefore, the outcomes of the study did not meet the requirements for this study.

Petter, DeLone and McLean (2008) conducted a qualitative literature review to measure the success of the 'IS' model, and found that it provides a successful framework both at individual and organizational level using the six-dimensional model: system quality,

information quality, service quality, use, user satisfaction and net benefits. The focus of the study was not on a HIS but to evaluate the IS model from theoretical information discipline perspective. The model can be adapted to any disciplines in a broader context as a foundation to develop a HIS. The specific context of this study is to develop a framework for a DMHIS using the six-dimensional intervention areas of minimum data set/information content, technical, behavioural, organization, information processing and network, and information quality. Therefore, the IS model evaluation outcomes can be used as the theoretical background for the study, but it is not a health-related study and does not meet the specific context of this study.

Ludwick and Doucette (2009) conducted a review of the current state of knowledge about HIS adaptation in PHC. The author provided two results: that the design quality, feature functionality, project management and previous experiences affect the HIS implementation and outcomes; however, the quality of care, patient safety and provider-patient relations cannot be positively or negatively affected. The results of the study require further supporting evidence or studies to prove that the quality of design, feature functionality, project management and previous experiences could not affect the quality of care, patient safety and provider-patient relationship. Thus the findings of study did not meet the specific context of this study.

4.9. 1.7 Data extraction from text and opinion papers

Articles which were included for further review and data extraction are described below.

Aqil, Lippeveld, Hozumi (2009) identified three determinant factors for a HIS: organizational, technical and behavioural. The outcome is the health systems performance and impact is the health status of the people.

The RHINO (2006) group used the Performance of Routine Information System Management (PRISM) framework for developing processes guidance on community participation in determining the information need, review and feedback and developing community information culture and network to link community to health facilities. The paper has functional elements that provide guidance in developing a minimum data set for use at PHC level, the use of information by health workers and identifying the link between the routine HIS and quality of care.

The WHO (2008) developed the Health Metric Network (HMN) framework to improve the availability, quality, value and use of timely and accurate health information. The framework has six components in three categories: (1) input: (i) HIS resources; (2) process: (i) indicators, (ii) data sources, (iii) data management; and (3) output: (i) Information production; and (ii) dissemination and use.

The WHO (2005b) developed a guideline for MHIS for developing countries, with a comprehensive guide on how to develop an MHIS and the main stages of the MHIS, including data collection, processing, analysing, dissemination and use of information. It also provides the type of information that should be collected at episode, case, facility, community and system levels. The indicators such as needs, inputs, processes and outcomes can be used to measure the various aspects of the mental health system. The relevance of networking with other information systems or the general HIS and the minimum data set required at community level, and stakeholder involvement in the design and development of the MHIS, was highlighted. The guidelines paper is included in the study for further review and synthesis.

The Health and Social Care Information Centre (2012) and the mental health informatics review provided mental health minimum data set (MHMDS) guidance for mental health

providers in relation to the introduction of such a data set and an update on MHMDS. The MHMDS in this document has 19 items for quarterly mandatory reporting for community mental health services, and the MHMDS is revised periodically as necessary.

The Australian Institute of Health and Welfare (2012) provided a set of elements agreed upon by the national health information management group for a mandatory, required and optional reporting system. It comprises 17 items of the national minimum data set for community mental health data elements for reporting.

Thus the above two articles satisfy the specific context of this study, and were included for further review and synthesis.

The WHO (2004b) developed guidelines for a HIMS for developing countries. The guideline comprises the type of data collected at hospital, district and village health service level. It has components of data validation for completeness, adequacy, timelines of reporting, analysis and feedback, and the basic resources for an effective HMIS in developing countries.

The South African DHIS policy (DoH, 2011) paper describes the eight challenges facing the DHIS, namely: limited alignment between goal and objective of health sectors, and inadequate involvement of programme managers at district, provincial and national level in analysing, reporting, feedback and use. In addition, a shortage of skilled information officers, inadequate IT infrastructure development and limited availability of data collection tools and lack of control for software were also cited. It was noted that there was poor utilization of ICT in HIS due to inadequate technical and human capacity. Appropriate training, regulation and patient safety and improving the quality of information services were recommended. The study under investigation is intending to develop a DMHIS framework through extracting a successful functional model in order to address these intervention areas so as to improve the

quality healthcare outcomes at district mental health service levels. As recommended, training of the actors is one of the key issues that need to be addressed in this study.



Table 4.9: Data extraction from text and expert opinion papers

Author(Ref.)	Publication type	Aim	Summary/conclusion	Recommendations
WHO (2008)	Framework and standard for country Health Metric Network	The goal of developing a Health Metric Network is to increase the availability, quality, value and use of timely and accurate health information	Discusses the HIS and standard for strengthening country HISs. The framework provided six components of HIS and the standard needed for each. These are divided to three categories: inputs (1. HISs' resources); process (2.indicators, 3 data sources, 4.data management) and outputs (5. information product, 6. dissemination and use)	The WHO HMN and standard provide the three components of an information system: inputs, process and outputs
WHO (2005)	MHIS guidelines	The purpose of the guidance package is to assist policy-makers and planners to develop MHISs	The guidelines have comprehensive strategies for design of more effective and efficient services using existing resources; provide effective service to people in need; for clinicians to provide appropriate, good-quality, evidence-based care; and to assist in reintegration of people with mental disorders into all aspects of community life, thus improving their overall quality of life. The guidance package consists of a series of interrelated modules that are designed to address the wide variety of needs and priorities in policy development and service planning. The characteristics of the MHMDS includes the characteristics of the patient; the nature of the problem suffered by the patient; the number of different interventions delivered to the patient; the way these are combined as packages and scheduled over time; how much the patient's condition changed.	This a general guidance package applicable at all levels of mental health services in all developing countries. each country can adapt this guidance package to develop their own MHIS. The MHMDS (information content) contains patient characteristics, nature of the problem, intervention and change in condition

RHINO (2006)	Workshop	To establish the principles and strategies of the network; developing district-managed routine HIS; and to prove the utility by applying it to facility- and community-based data collection and use of information	The RHINO authors explored the collection and use of information at facility and community levels on the basis of two underlying conceptual approaches: decentralization of information management as an effective strategy to improve routine information systems; and the use of PRISM framework for improving performance. The PRISM framework is an analytical process for better understanding routine HIS performance (defined as sustainable production of quality data and continued use of health information for evidence-based decision making). The authors addressed seven cross-cutting issues: (1) information design and demand; (2) data quality; (3) information use; (4) quality of services; (5) ICT; (6) integration; and (7) information system management.	It was suggested that there needs to be community participation on information needs, review and feedback and developing community information culture, and network should be linked to community, health facility/PHC unit. Also required is a manual on information system for health workers at primary care level and referral monitoring systems (computerized)
Health and Social Care Information Centre (2012)	Mental Health Informatics Review guidelines	To identify gaps and issues with MHMDS set	The paper comprises MHMDS guidance for mental health providers in relation to introduction of the MHMDS and also provides an update on the MHMDS. This MHMDS has 19 items for quarterly mandatory reporting for community mental health services and this is reviewed periodically as necessary	The document provided guidance on MHMDS development, collection process and utilization, including the type of data that is reported as mandatory, on requirement and optional. This document can be adapted to develop the local MHMDS as this study indicated.
Australian Institute of Health and Welfare (2012)	Document review	To provide a core set of data elements agreed by the national Health Information Management Group for mandatory collection and reporting at a national level	The document comprises the community mental healthcare national minimum data set, its associated data elements and data provided through the community mental health care NMDS supplements reported for psychiatric and acute care hospital through the admitted patient mental health care NMDS. The statistical analysis units are service contact dates	The document provided national minimum data set for community mental health data elements and the NMDS is classified as mandatory, required and optional. The purpose of each data element is defined. The MHMDS is similar to the UK health and social care MHMDS. This document can be adapted to develop a local MHMDS for community mental health services
Aqil,	Innovative	Developing a	The author used three determinant factors to develop the	It was recommended that PRISM

Lippe- veld & Hozu mi (2009)	approach to design	framework for effective use of routine HIS	PRISM framework: environmental/organizational, technical and behavioural determinants. These determinants play the input role in the routine HIS process, improved routine HIS performance as an output, and outcome is improved health systems performance, and impact is improved health status. The PRISM framework was piloted to at different developing countries and has shown positive outcomes	framework provide a ground for development of interventions for strengthening or reforming the routine HIS and provide a paradigm shift by emphasising routine HIS performance
DoH (2011)	DHIS policy develop- ment	Developing a policy to enhance the performance of the DHIS	DHIS policy was developed based on the WHO (2007) HIS framework for developing countries. The policy provided a summary of 8 key challenges of DHIS that need to be addressed: limited alignment between goal and objectives of health sector, key indicators of success and information system; inadequate involvement of programme managers at district, provincial and national level in data validation, analysis, reporting, feedback and use; shortage of experienced information officers; inadequate ICT infrastructure dev't; limited availability of paper-based data collection tools, limited or no version of control for basic software	Strengthening DHMIS as vital component of comprehensive and integrated HMIS that provides evidence of tracking the performance of the national HIS and the impact on health system. Involvement of managers at district level, timely feedback and utilization, experienced information officer, ICT infrastructure are essential
WHO (2004 b)	Guideline develop- ment for HMIS	To develop guideline for HMIS	The document provides the general guidelines for health management of information system in developing countries, the type of data collected at hospital, district and village level, methods of collection and checking of data completeness, adequacy, relevance and accuracy, timelines for reporting, analysis and feedback. It also provide terms of technical expertise, financial and organizational resources	The guideline recommended information validation system, feedback, and technical expertise, financial and organizational resources for HIS

4.9.1.8 Concept identification

The functional concepts and key concepts outlined in Table 4:10 were identified from non-research-based paper data extraction.

Table 4.10: Findings from systematic review of text and expert opinion papers

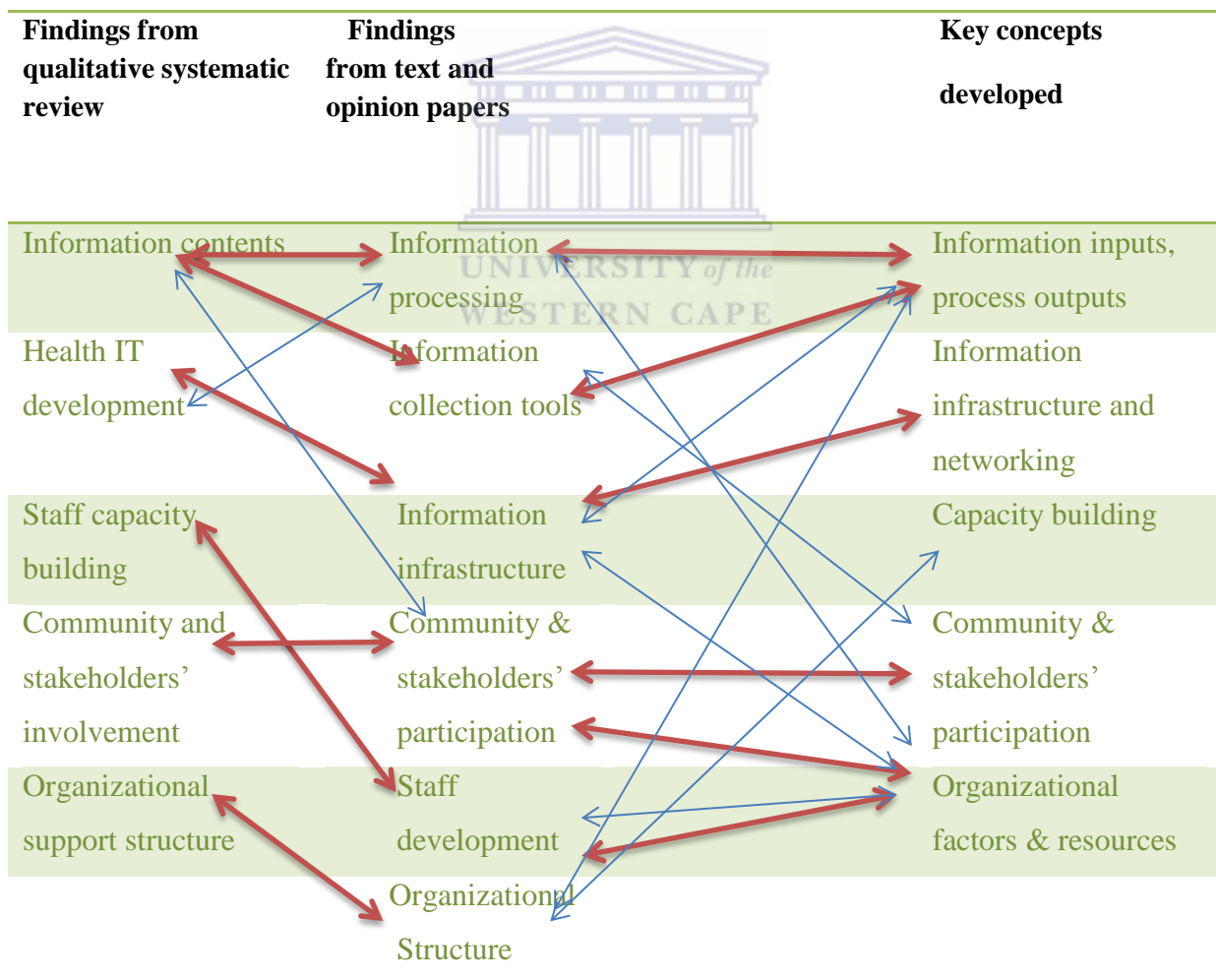
Concepts identified	Key concepts developed
<ul style="list-style-type: none"> • The process of information system: inputs, process & outputs • Timely feedback & utilization • Information validation guidance & feedback 	Quality of information processing (inputs, process, outputs & feedback)
<ul style="list-style-type: none"> • Minimum data set: patient characteristics, identified problem, intervention and change as the result of intervention • MHMDS • National minimum data set for community mental health data element 	Standardised and required information contents
<ul style="list-style-type: none"> • Networking link to community health facility • Referral monitoring system (computerised) • ICT infrastructure 	IT infrastructure & network
<ul style="list-style-type: none"> • Community participation on information needs, & review • Developing community information culture • Involvement of managers 	Community & stakeholders' involvement & information needs
<ul style="list-style-type: none"> • Guidance on data collection, process & utilization • Integrated HMIS that provides evidence of tracking the performance of national health • Experienced information officer • Technical expertise 	Knowledgeable personnel and technical expertise in HIS
<ul style="list-style-type: none"> • Financial resources • Organizational culture • Human & technology resources 	Resources

4.9.1.9 Concept building and synthesis

Five themes which emerged from the systematic review are community and stakeholders' participation; infrastructure; information inputs, process and outputs; organizational structure and staff empowerment. Qualitative systematic review identified five key functional concepts

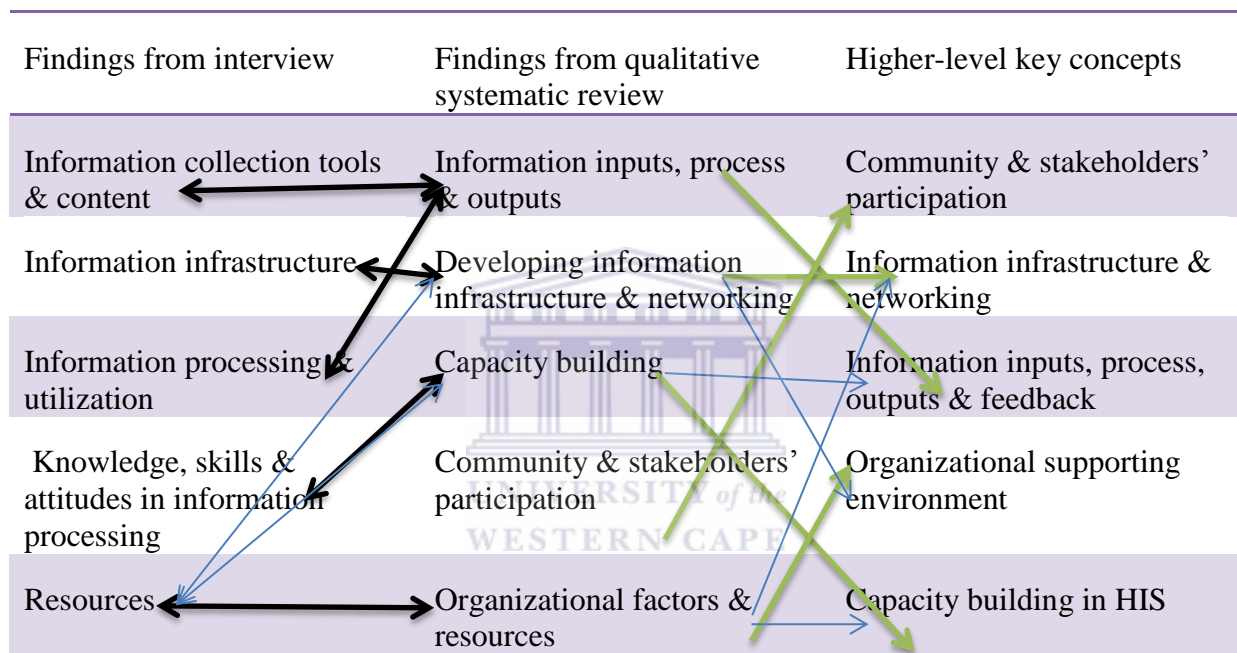
(see Table 4.6) and from text and opinion papers six key functional concepts (see Table 4.10) were identified. The successful functional elements identified from qualitative research papers and the text and opinion papers were combined and linkages were created and key concepts developed, which were also linked to the empirical findings, as shown in Table 4.11. Then the higher key concepts were developed – and these higher-level concepts are the building blocks of the framework. Table 4.11 shows the links between the findings from qualitative research papers and the text and opinion papers and the developed key concepts respectively.

Table 4.11: Links and concept development from the findings of the qualitative systematic review and text/expert opinion papers



As indicated in the summary of interview findings in Table 4.12, there are five central themes identified as the major problems area in the district MHIS. This table shows the linkage and key concepts development from the interviews and key concepts from the qualitative systematic review.

Table 4.12: Link and higher-level concept development from key findings of the empirical and systematic review



4.9.2 Higher-level concepts

The higher-level concepts were developed from the findings of both empirical and systematic review findings.

4.9.2.1 Community and stakeholders' participation

The systematic review of this study supported participation of community and stakeholders in the design and implementation of the DHIS for successful outcomes. Odhiambo-Otieno (2005) argued that the district health information failed due to lack of involvement of the health managers and health workers in the design and implementation of the DHIS. The

author emphasises that when the project is designed and developed at higher level and dictated down for implementation by ignoring the importance of involving the operators/users in the design and development, implementation is always challenging. Garrib *et al.*'s (2008) study indicated that the data should meet the needs of operator and users, where the needs of the users can only be understood through involving them in the design. Aqil *et al.* (2009) and RHINO (2006) reported that community participation for information needs, feedback, developing a community information culture, and creating a network that links community and the health facility improves the quality of information processing and utilization, which in turn impacts on the outcomes of health services.

The feedback mechanism created for workers and community members is an incentive to motivate data operators to improve the quality of the data. Furthermore, clear understanding of community needs motivates collection of better data to address those needs. The top-down DHIS system in South Africa resulted in many challenges, such as poor coordination of leadership and lack of health worker participation due to lack of understanding of the value of data and needs. However, success stories of other countries' experiences indicated that the bottom-up HIS model which involves community and stakeholders shares best practices in system implementation.

An example of a success story is the National Rural Health Mission project in India established in 2005 with the aim of achieving the target set by MDGs 4, 5 and 6, which made the health delivery system more responsive to the healthcare needs of the population by empowering communities and health workers through feedback and participatory mechanisms (Nandan,2010) This success came about through involving community and stakeholders in the design, planning and implementation process of community projects.

4.9.2.2 Information infrastructure

Infrastructure is the foundation to creating an enabling ICT environment. It introduces standards that enable the consistent and accurate collection and exchange of health information across the health system and services (WHO, 2012). It forms the foundation for electronic information exchange across geographical and health sector boundaries: physical infrastructure, e.g. network, care services and applications that underpin national eHealth environment. It provides a tangible means for enabling services and systems, access to exchange and management of information and content. Information infrastructure also involves a sound policy, legislation and workforce to enable establishment of a HIS (Vital Wave Consulting, 2009; WHO, 2012). The same applies in the development of a DMHIS.

Many high-income countries have already established a standardised and interoperable information infrastructure; standardization and interoperability enable the storage of health data sets using data structure, exchange of structured data, unique identification of individuals, healthcare providers and healthcare organizations, and secure transmission of health information between healthcare providers. It also enables the consistent and accurate collection and exchange of health information across geographical and health sectors (RHINO, 2006; WHO, 2008, 2012). Without these components health information cannot be collected consistently; it is usually open for misinterpretation and difficult to share due to incompatibilities in data structure and terminologies. There are commonly agreed interoperable requirements or standards for eHealth or other ICT services and applications. Mobile devices are one of the fastest developing key enablers for HIS; network coverage has expanded extensively and reached most of the population of the world (Vital Wave Consulting, 2009). Accreditation standards for eHealth services and applications focus on ensuring interoperability with other services.

Computing infrastructures are available at national, provincial and district managerial level. However, according to the DoH's (2011) DHIS policy, some of the key challenges were inadequate IT infrastructure development, and lack of skilled information officers and of alignment between goals and objectives in the health sectors. This resulted in limited availability of data collection tools and lack of control for software.

This study identified that district mental health providers do not yet have computers and network-based communication. Adoption of ICT is limited to managerial and administrative level. However, some segments of health services, such as HIV/AIDS clinics, have computers for data collection and reporting. The capacity and coverage of data connectivity and networking, such mobile phone coverage across the district health system, are very limited. Computers and the Internet in general are not available for health providers. However, there is a high possibility that the existing infrastructure components can be scaled up to reach lower levels of health service providers. Currently in Cape Town some tertiary hospitals have transformed to an electronic medical recording system.

4.9.2.3 Information inputs, process, outputs and feedback

The term information process involves inputs, process, outputs, outcomes and feedback. Apart from technical, human, financial, infrastructure and behaviour inputs, information inputs are the minimum data set, standard information collection tools and content and indicators. Developing consensus is that a MHMDS is crucial for a DMHIS. The Australian Institute of Health and Welfare (2012), Health and Social Care Information Centre (2012), Vital Wave Consulting (2009) and Aqil *et al.* (2009) have developed a minimum data set for community mental health/PHC. Some of them have three different types of data collection and reporting systems, i.e. mandatory, required and optional reporting systems. They also

indicated that understanding of the indicators by operators/users reduces duplication and improves quality data. It was a recommendation that the consensus adaptation of a minimum set of essential data needs to be established, based on the common data needs. The MHMDS is usually designed to reflect the rich complexity of patient needs. As patients' needs change, a review of the MHMDS should be undertaken. The MHMDS includes elderly patients, who receive specialist mental health services. This is identified as the total period during which the patient receives care from specialist mental health staff, comprising outpatient attendance over a few weeks, or extended for many years, and includes hospital, community, outpatient and daycare episodes.

The MHMDS record included characteristics of the patient, including where they live; the nature and extent of the problems; the different interventions given; health and local organizations involved; and the change in the patient's condition over time (Australian Institute of Health and Welfare, 2012; Health and Social Care Information Centre, 2012). The authors also suggested that periodical updating of the minimum data set is necessary as the need arises. Vital Wave Consulting (2009) argue that addressing the issue of incentives in the form of feedback surrounding data collection and burden improves the quality of data collection and processing. Although quality of data is not primarily a technological issue, technology can assist in improving it. Therefore, the poor quality of data is largely a function of the burden of existing data collection and lack of incentives. The technology can do little in term of accurate reporting.

Multi-country case studies documented some success stories. For example, the SIGA SAUDE system in Sao Paulo in terms of quality data capturing in real-time at routine patient scheduling and care; Smart care electronic record system in Zambia gathering quality data on individuals in lower strata – also found to be important in monitoring the quality of care; the hybrid system of paper-based recording and reporting at lower level and data entry into a

central data bank at national level, as well as the innovative mobile health information networking, data collection and transmission via wireless link, in Uganda; the TRANCET project in Rwanda has mobile health to collect data on HIV patients; the National Rural Health Mission in India focusing on maternal/child automated data processing system established a strong monitoring and evaluation system for tracking programme performance; and Serra Leone's integrated district reporting system with an electronic medical record system has documented progress in the HIS (Aqil *et al.*, 2009). These countries have potential outcomes associated with an interoperable HIS, which provides a structured HIS to healthcare providers in terms of the information they need in order to provide quality care and education to their patients and the community. However, none of these developing countries reported the degree of utilization of health information at lower level and whether they have developed a minimum data set for mental health recording and reporting. Information processing itself requires indicators, computers with software for data analysis, data sources/data collection, data management, quality checking, transmission and feedback. It also requires skilled and experienced personnel to process the quality information timeously.

The outputs are the production of information, dissemination, feedback and use. The outcomes are the health system performance as a whole, and the improved health status is the impact that needs to be achieved. Data validation for relevance, completeness, adequacy and timelines of reporting are part of the process. Monitoring is key for tracking the improvement; therefore, a formal process of checking data quality should be established (Berwick, 1996). The data validation process can usually be conducted by triangulating other data sources to verify and improve data quality. Furthermore, the validation process requires dedicated and experienced data managers as far down as PHC care level that can identify and analyse data and work with health providers to improve data collection and quality.

The enhanced analysis and two-way information flow allows the health workers and higher-level health managers to see and understand health trends and formulate an effective response, as well as empowering the health workers to use data. Feedback is another key process for identifying problems for solution, for regulating and improving performance at individual and system levels, and for identifying opportunities for learning (Knight, 1995). As indicated in the results from the interviews, despite the fact that feedback is an important factor for success of a DHIS, the top-down feedback was very weak, particularly for health workers, where it is almost non-existent. Thus the process of information outcomes is determined by the type of inputs, validation and feedback system.

4.9.2.4 Organizational supporting environment

Three determinants have been identified that can have a negative or positive impact on a HIS: technical expertise, organizational, and behavioural factors (Aqil *et al.*, 2009). Behavioural determinants are the knowledge, skills, attitudes, values, confidence and motivation of the people who collect and use data at different service provision levels. This factor has a direct influence on the health workers, information clerk/officer, and facility/data managers, as they are directly involved in the data collection and process. In other words, the behaviour of the performance level is influenced by the level of knowledge, skills and attitudes, and motivation of those dealing with data collection and management.

This study identified that there is a competence gap among those dealing with data collection and processing the information. As reported earlier in this chapter, there were negative attitudes among the health workers towards collecting information accurately, because they believe that information collection is a waste of time and reduces the time available for quality of care. This negative attitude in turn affects the quality of information processing.

The other factors that influence the quality of information processing are the understanding of the actors about the indicators and concept of data, the ability to analyse, interpret and utilize the data, as well as the type and availability of tools. The ability to measure data quality and utilization of the information for decision making is determined by the knowledge and skills of personnel. To operate with computers, Internet networking and information system software for data processing and dissemination, the staff need to be trained. Electronic health recording system improves patient health outcomes only when patient data are analysed and translated into practice.

The technical aspects of determinants are defined by Aqil *et al.* (2009) as “the factors that are related to the specialized know how and technology to develop, manage and improved RHIS process and performance”. The data collection process, designing data collection tools, type of IT, and user-friendly software for data processing and analysis are crucial factors in HISs. IT is the core component of an information system for faster operation and communication. Operating and using technology effectively requires a good knowledge of and skills in technology. Knowledge and technology skills are the major challenges identified by this study to run a DHIS; they also affect the confidence and motivation levels of the actors (Aqil *et al.* 2009).

Organizational determinants refer to the organizational context such as rules, values, practices and the health system (WHO, 2005; Aqil *et al.*, 2009). Other organizational factors are the inadequacies in human and financial resources, low management support, lack of supervision and leadership, which affects the data collection and processing (Rotich, Human, Smith, Bii, Odero, & Vu, 2003; Kamadjeu, Tapang & Moluh, 2005; Odhiambo-Otieno, 2005; Aqil *et al.*, 2009). Organizational factors are responsible for developing an information culture and structure, and securing sustainable resources, roles and responsibility of the health system. The organizational factors affect the performance of data collection and processing

directly or indirectly through the behavioural factors. Putting emphasis on measuring organizational processes of human and technology interaction that leads to quality services and products is crucial. It is indicated that performance is a system characteristic; it designed to achieve certain goals and objectives (Berwick, 1996). Thus all components of the system, its actors, leaders and workers, are the role players in achieving better performance in a routine HIS (Aqil *et al.*, 2009). Shein (1991) notes that organizational culture is a body of solutions to problems; therefore understanding the organizational culture is crucial to improve performance. While for Hozumi *et al.* (2002) and Hotchkiss, Aqil, Lippeveld and Mukooyo (2010) organizational culture is the capacity and control to enhance values and beliefs among members of an organization by collecting, analysing and using information to accomplish organization's goals and mission.

To measure the culture of information, values related to organizational processes emphasize data quality, use of information, evidence-based decision making, problem solving, feedback from staff and community, a sense of responsibility, empowerment and accountability (Ajzen, 2005). The existing gaps in an organization can be used to enhance a culture of information, to motivate higher-level management to influence them to commit and dedicate to developing an information culture and strengthening the performance of a routine HIS (Aqil *et al.*, 2009).

4.9.2.5 Capacity building in HIS

Capacity development through skills training of health workers, health managers and information officers on data collection, analysis, interpretation, data concept development and utilization is one of the crucial factors in the HIS (WHO, 2005 b). Skills training is key to the behavioural factors in determining the success of a HIS. Although training was not

discussed in detail, the type of training reflected was technical skills related to use of the system, training related to the use of information and the application of principles of quality improvement programmes (RHINO, 2006). Vital Wave Consulting (2009) identified poor data quality as a serious problem, and data streamlining and validation of data efforts are problematic in developing countries. One of the primary reasons contributing to the poor data quality was a shortage of qualified personnel, particularly those responsible for service provision, such as doctors, nurses and auxiliary nurse midwives. It was highlighted that capacity building through sufficient education should not only assist them on how to work with the HIS, but also why it should be used. Knowledge of why it is necessary to use the new system is crucial, because the healthcare providers are concerned with the load of managing clinical needs (Littlejohn *et al.*, 2003).


The importance of having room for personal development through involvement in the information system was highlighted. RHINO (2006) notes that the heartbeat of any routine HIS is the motivated health worker. As data collection is not their primary task, they wanted to know what incentives exist for staff members in data collection. Observation of a Thai HIS indicated that incentives are not monetary but symbolic; most workers are given frequent feedback and made to feel that their work is important. Data collection and use are also promoted as attributes of excellent work. Routine health worker training and strong management support could address issues around health workers' motivation for data collection and use (RHINO, 2006).

4.9.3 Information matrix using phase one and phase two results


In the matrix table 4.13 below is a grid which each location in the grid contain a specific information. The vertical line (column) to the left represents problems that were identified


from phase one study. These are lack of standardised information collection tools and contents, limited information infrastructure, poor information processing system; information competency training was not available for health providers, and inadequate resources .e.g. human, technical and financial. The horizontal line (row) at the top represents the successful functional elements findings from phase two study (a systematic review). These are the successful functional elements were extracted using systematic review towards identifying solutions to the identified problems in phase one study organizational support structure; information infrastructure; inputs, process, outputs and feedback; community and stakeholders participation; and capacity building. Each of the specifications of information listed under the key successful functional elements are addressing to the problems identified in the left side of the vertical column.(see Table 4.13).



	Community & stakeholders' participation	Information infrastructure	Information inputs, process & outputs	Organizational supporting environment	Capacity building in HIS
Lack of standard Information collection tools/content	<ul style="list-style-type: none"> ▶ Clinical staff, management, community should participate in the design and implementation of tools and content. ▶ Consensus adaptation of MHMDS based on the needs and indicators 	<ul style="list-style-type: none"> ▶ Standard tools/forms for collecting, and reporting: ▶ characteristics of the patient ▶ the nature and extent of the problems ▶ intervention delivered to the patient ▶ patient condition over time 	<p>Require indicators for data collection. Quality and required amount of information</p> 	<ul style="list-style-type: none"> ▶ Availability of tools/forms all the time. It should be acceptable at lower level and higher level. ▶ It should be purpose-driven 	
Information infra-structure requirements		<ul style="list-style-type: none"> ▶ Computers, software, Internet, data bank, networking, mobile information networking (wireless transmission of data/information ▶ Hybrid system reporting ▶ Integrated DHIS with medical record system (MRS) 	<ul style="list-style-type: none"> ▶ Organizational structure and support system. Data flow structure and strategies for utilization 	<ul style="list-style-type: none"> ▶ Atomization recording system improves patient health outcomes ▶ Organization refers to rules, value, practice and health system ▶ Organizational factors affect the performance of data collection and processing directly or indirectly through behavioural factors ▶ Good organizational culture is a solution to problem 	
Poor Information process	<ul style="list-style-type: none"> ▶ Actors/user should be involved in the 	<ul style="list-style-type: none"> ◆ Monitoring and evaluation/tracking the programme 	<ul style="list-style-type: none"> ◆ Information process requires: ◆ indicator 	<ul style="list-style-type: none"> ◆ Inputs, process, outputs and outcomes are the stages of information processing 	

	<p>design and implementation; Community participation and ownership feedback; empower community health workers</p>	<p>performance Improve incentives to data collectors</p>	<ul style="list-style-type: none"> ◆ data management ◆ analysis ◆ quality check ◆ interpret ◆ transmission and feedback. ◆ Outputs are production of information, dissemination, and feedback and use ◆ Outcomes are health system improvemen. ◆ Data validation by triangulating other data source. ◆ Feedback is another key process to identify problems for solution. ◆ The process is determined by inputs 	<ul style="list-style-type: none"> ◆ Inputs are resources of skilled personnel, financial and technical. ◆ Understanding organizational culture is critical to improve information processing performance. ◆ Value related to organizational process emphasis: <ul style="list-style-type: none"> ◆ data quality ◆ use of information ◆ evidence-based decision making, ◆ problem solving, ◆ feedback from staff ◆ community, sense of responsibility ◆ empowerment and ◆ accountability 	
Poor Information quality	<ul style="list-style-type: none"> ▶ The data should meet the needs of users ▶ Feedback is incentive to motivate data collectors to improve the quality ▶ Understanding community needs motivates to collect better data ▶ Bottom-up 	<p>Appropriately designed indicators reduce the duplication and improve quality of data Poor quality of data is also due to lack of incentives and burden of data work</p>	<p>The quality of inputs and process determine the quality outcomes of information</p>	<p>Availability of resources such as technical, human, financial and organizational determine the quality of information</p>	<ul style="list-style-type: none"> ▶ Competency gap, negative attitudes affect quality of data/ information ▶ Poor understanding of the indicators affect the quality of data ▶ Lack of knowledge and technology skills affect the confidence and motivation level of

	<p>DHIS model improves:</p> <ul style="list-style-type: none"> ◆ data quality, ◆ coordination ◆ participation from health workers ◆ understanding of the indicator ◆ the value of data 				the actors and the quality of data processing
Lack of resources: human, finance, technical			<p>▶ Dedicated data managers that work with providers</p>  <p>UNIVERSITY of the WESTERN CAPE</p>	<p>▶ Technical expertise, organizational environment, behavioural factors</p> <p>▶ Technical aspect also includes:</p> <ul style="list-style-type: none"> ▶ human and financial resources ▶ management support ▶ supervision and leadership <p>▶ Organizational factors are responsible for developing information culture, infrastructure, securing sustainable resources, role and responsibility of health system</p>	<p>▶ Addressing shortage of qualified health workers, such as nurses and doctors</p> <ul style="list-style-type: none"> ▶ Balancing the load of work ▶ Improve the quality of data collection and processing ▶ Health workers are concerned with load of clinical management needs ▶ HIS is not their primary task. ▶ Strong management support and addressing the issues of workload & motivate for data collection and use
Lack of Information	▶ Users understand and develop			▶ Knowledge, skills, attitudes, values, confidence and	▶ Skills training change thes

competency	knowledge and skills by involving them in the design and implementation of a project			<p>motivation</p> <ul style="list-style-type: none"> ▶ Information competency has direct influence on the behaviour of health workers and health managers ▶ Lack of competency affects the ability to analyse, interpret, data utilization ▶ Staff training on computer skills and Internet networking, data processing and dissemination is crucial ▶ Ability to measure data quality and utilization, and decision making requires knowledge and skills ▶ Capacity building enhance values and beliefs among the members of the organization to accomplish organizational goals and mission 	<p>behaviour that determines the success of HIS.</p> <ul style="list-style-type: none"> ▶ Technical skills training on the use of the system ▶ Sufficient education to empower the staff on why it should be used, why it is necessary to use the new systems ▶ Routine health workers' training motivates them for quality of data collection and processing
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4.13: Matrix table 4.13 showing how each of the specifications in each blocks responds to the key problems areas outlined to the leftside of the vertical column

4.9.4 Conclusions

Community and stakeholders' participation, infrastructure, organizational support structure, information inputs, process and outputs, and staff capacity building/empowerment are key findings of the systematic review that may assist with the identified gaps in this study. Unfortunately the findings from systematic review are not specific to MHIS, but are applicable to a HIS. However, information collection tools and contents (indicators and minimum data set) from phase one and phase two findings are specific to an MHIS.

In many parts of the world community health services are more commonly understood than the district-based health system. This study uses both the district health system and community health services interchangeably, because South Africa has a district health system. The community participation includes mental health consumers, local community representatives, health workers and health managers, and stakeholders include the DoH, health managers, CEOs, mental health board, NGOs, mental health policy makers and training institutions. Furthermore, community information needs, feedback and developing an community information culture improves the quality of information processing and utilization. An essential minimum mental health data set should be developed based on consensus adaptation that responds to the need of the community.

Vital Wave Consulting (2009) argue that poor data quality is as the result of poor feedback and lack of incentives to the primary data collectors. Aqil, Lippeveld & Hozumi, (2009) mentioned that Performance Routine Information Systems management (PRISM) has three determinant factors of information processing, technical, organizational and behavioural, which are inputs in the information processing; hence the outputs and outcomes are determined by the type of inputs applied to process the information. Addressing the inputs adequately will have a positive impact on the outputs and outcomes of the HIS. Empowering

staff with knowledge and skills has a significant effect on the performance and changing the attitudes of the primary data collectors and users. It provides a feeling of ownership, of taking responsibility and accountability. Investing in staff empowerment will improve the quality of data collection, analysis, interpretation and utilization. This in turn will bring a significant improvement in the health system and health status of the people.

The information matrix above provided a clear picture of how the five intervention areas can be addressed using the five key functional elements extracted from the systematic review. Therefore the researcher uses these five key themes as the building blocks of the development of a DMHIS.

The following mapping table shows the current status of the DMHIS in the Western Cape Metropole region. It helps to understand what mental health information activities are currently available within the DHIS, the type of information that is collected and processed for mental health, the feedback system and outcomes.

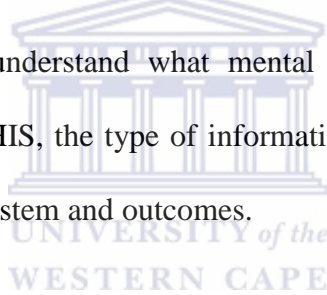


Table 4.14: Mapping the current DMHIS in the Cape Town Metropole region in the Western Cape

Inputs	Process	Out puts	Outcomes
<ul style="list-style-type: none"> ➤ DHIS policy ➤ Facility manager is responsible person for DHIS ➤ Little investment in ICT: computer for administrative use by facility manager, reception, pharmacy and for some information clerks ➤ Headcount data collection systems ➤ tools: Register book, tally sheet, RMR ➤ One information clerk per facility ➤ Data collectors: mainly mental health nurses and at times doctors ➤ Top-down instruction for implementation tools and type of content to be collected 	<p>Facility level:</p> <ul style="list-style-type: none"> ➤ Manual data collection and collation ➤ Headcount data ➤ Poor quality of information recording and processing ➤ No data analysis at facility level ➤ Monthly report to substructure office ➤ Superficial data validation by facility manager ➤ Manual patient referral process ➤ Manual or electronic, or using both means of monthly reporting <p>Substructure office (SSO):</p> <ul style="list-style-type: none"> ➤ Data entry into software ➤ Data validation for inconsistencies and discrepancies using software ➤ No analysis of data ➤ Quarterly feedback meeting with facility managers ➤ No feedback to data health workers and collators <p>Provincial level:</p> <ul style="list-style-type: none"> ➤ Data storage and analysis ➤ No feedback in terms of data analysis to healthcare provider for use <p>National:</p> <ul style="list-style-type: none"> ➤ Data storage and analysis ➤ No feedback to facility in terms of data analysis for use and decision making 	<ul style="list-style-type: none"> ➤ No dissemination of information ➤ No feedback in terms of data analysis for use/ decision making ➤ Decision: Budget allocation according to headcount ➤ Decision: Manpower allocation according to headcount ➤ Little access and information sharing with patient 	<ul style="list-style-type: none"> ➤ Outcomes measure ➤ No indication of mental health system improvement ➤ Dissatisfaction of client and healthcare providers with information systems and health services



4.10 Phase three: Design and development of a framework for a DMHIS

4.10.1 Design and development of a framework

Objective five of this study was addressed using phase three of the adapted intervention research design and development model. The design and early development phase using the adapted model of Strydom *et al.* (2007) most often involved synthesis of the findings of phase one and phase two. The researcher therefore pulled together and synthesized the findings from phase one - interviews and document reviews; and phase two - systematic review.

The design is the method used to convert research findings into the social intervention. Rothman and Thomas (1994) define design as “the planful and systematic application of relevant scientific, technical and practical information to the creation and assembly of innovation appropriate in human service intervention”. The design and early development phase includes the following activities: identify design problems; specify the boundaries of the domain of design and early development; generate, select and assemble solution alternatives; formulate initial framework and initiate proceduralization (Rothman & Thomas, 1994). Then the researcher developed the matrix table to show how the findings from the systematic review respond to (address) the gaps identified from the empirical study in phase one. Thus, the proposed framework was designed and developed based on the identified research findings in phases one and two.

The framework descriptive information was converted from descriptive to prescriptive and from statement form to a statement of how the manipulation of one variable may result in particular changes in other variables. The generation of alternatives from variable information is an important step in design and development, and is necessary in order to design the

intervention. Three criteria exist as conditions to be considered: completeness, compatibility and relatedness of adequate assembly of the variables. Following the formulation of intervention design and development, proceduralization was set in an orderly sequence of instructions, with the intention of making it easier for users to make decisions, follow guidelines and carry out the desired behaviour. Proceduralization consists of provision of practice principles, practice guidelines and a list of recommended activities.

The findings of the qualitative interviews, document review and drawing the successful functional elements from systematic review provided informed evidence for design and development of a framework for a DMHIS in this study.

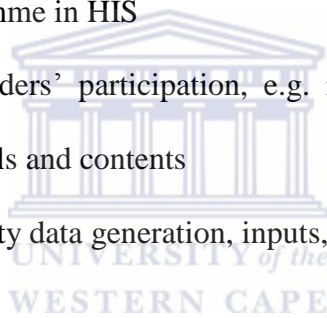
The findings from the interview and document reviews were lack of standardised information collection tools and contents; poor information infrastructure for collecting and processing patient information; poor quality of information processing and utilization; inadequate capacity building (information competency); and limited resources for information system development. In addressing these problems a systematic review was conducted to identify evidence of successful functional elements. The findings were community and stakeholders' participation in the design and implementation of the information system; information infrastructure suitable to the local context; information inputs, process and outputs; organizational support structure; and capacity building/staff development programme. Therefore the five functional elements were used to design and develop the framework for a DMHIS.

Subsequently the developed framework was reviewed by study participants, a technical expert team from the mental health field (such as mental health nurses and psychiatrists), government representatives and HIS, as well as through external expert consultations.

The inputs of reviewers ensured that the framework for a DMHIS is based on the current evidence and appropriate to the local context. The framework was developed understanding the existing DHIS policy guidelines and recommendation from the WHO (2005b) MHIS. The purpose of the study was to develop an appropriate framework that can fit the local context of the district health system in South Africa.

The framework is made up of the five equally important dimensional determinant factors, listed below according to their orderly requirements and application to develop a DMHIS:

1. Organizational support structure
2. Information infrastructure suitable for local context of DMHIS
3. Capacity building programme in HIS
4. Community and stakeholders' participation, e.g. in design and implementation of information collection tools and contents
5. Develop a culture of quality data generation, inputs, processing, outputs, feedback and utilization.



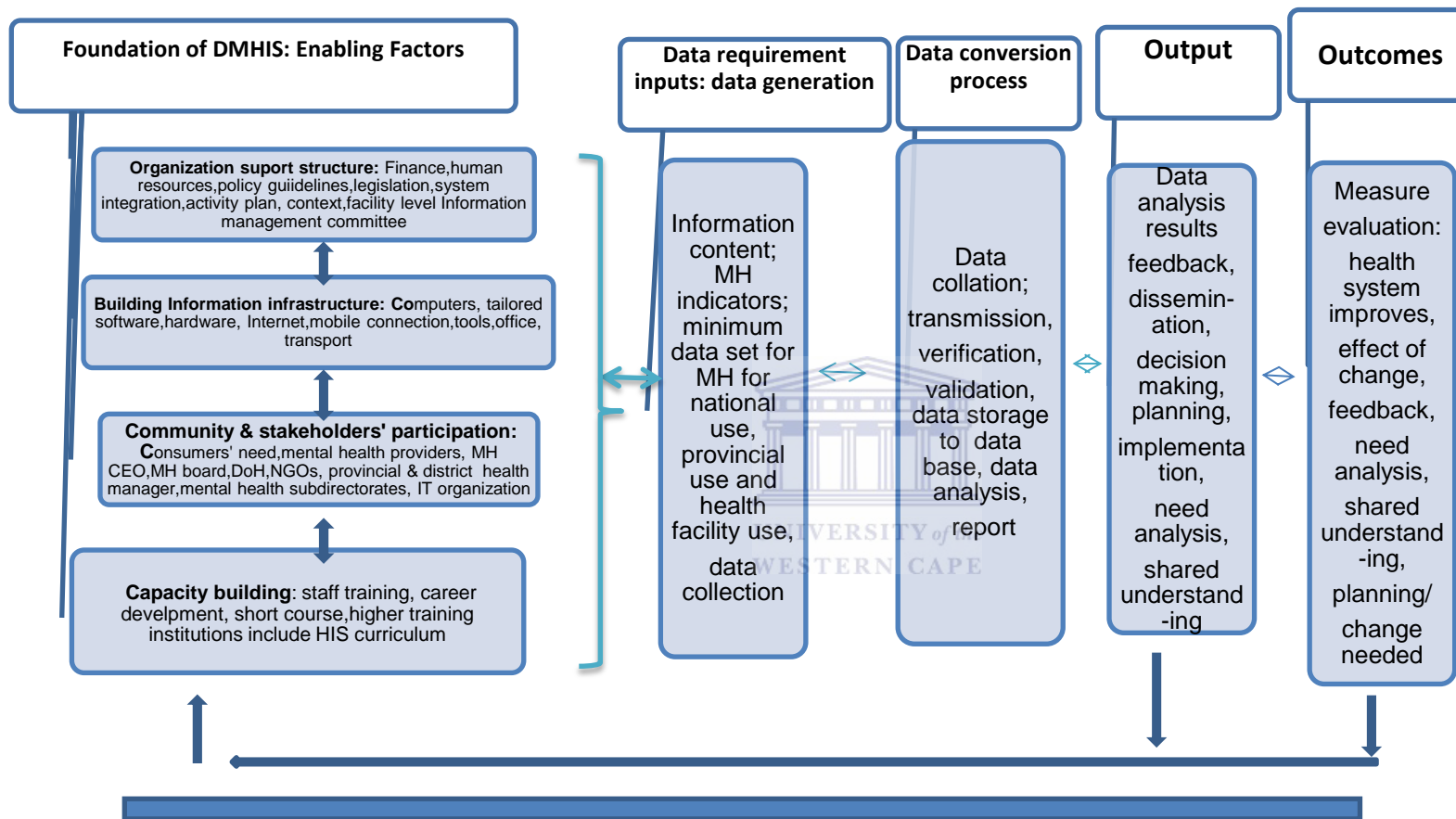





Figure 4.3: Framework for DMHIS

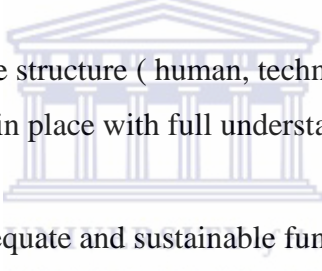
-  = data/information transfer from one stage to the next and back for correction in case of error
-  = relationship/integrated system functions of the four foundation blocks
-  = indicate output and outcomes feedback directed to the data requirement (inputs) and integrated system for use

The framework shows the relationship and interoperability of the components of the five functional elements that determine the outcomes of the DMHIS. Therefore an effective district MHIS requires these dimensional interoperable factors. It is very important to realise that this framework is not a mature framework as the MHIS is a new field and still in development; hence the framework is dynamic in nature and open to development.

4.10.2 Proceduralization process of the framework

The anchors of the framework are described in an orderly sequence to prioritise the activities in the five stages.

Stage 1. Developing organizational structure

- 
- Organizational supportive structure (human, technical, behavioural and financial resources) should be put in place with full understanding of the benefits of developing DMHIS
 - Ensure availability of adequate and sustainable funding
 - Ensure availability of dedicated team and stakeholders
 - Set the goal and mission with stakeholders
 - Assign an experienced and dedicated health information manager to run the project
 - Design and develop the organogram of the project

Stage 2. Developing information infrastructure and networking suitable for local context of DMHIS

- Develop information infrastructure that is necessary and acceptable to the local context
- Organize computer, hardware, and software system that is adjusted to mental health indicators and minimum data set, and care of patient
- Skilled personnel to run and maintain the new adopted technology
- Identify and install the necessary network system in consultation with the stakeholders and needs of users

- Set boundaries on how to use and for what purpose or to what extent the computer and the network can be used, e.g. data collection and recording, storage, analysis and transmission, reporting, pills reminder, e-prescription, information sharing and networking and monitoring clinical caseload
- Identify requirements and needs
- Define the purpose and usage of the new technology

Stage 3. Capacity building programme in HIS

- Train staff on information system, e.g. about indicators, minimum data set, accurate recording and processing, analysis, dissemination, feedback and use of information for planning of patient care and preventive measures
- Train/update staff on the new technology, and on how to use effectively and efficiently
- Staff should be classified according to their prior knowledge and computer skills for an effective learning process based on their level of knowledge
- Establish continuous staff development /career development programme



Stage 4. Community and stakeholders' participation in design and implementation

- With the involvement of community and stakeholders assess the community and users' information needs
- Design and develop standardised information collection tools responsive to the community and users' needs
- Develop minimum data set and indicators based on the consensus of community and stakeholders
- Pilot testing of the information collection tools, and modify as necessary
- Make the standards of information collection tools acceptable both at national and international level
- Make the information collection tools simple, precise and user-friendly
- Develop a simple, user-friendly user's manual of practice guidelines on how to use the new technology and how to use information collection tools, and a manual that explains about the minimum data set and indicators

- Develop data validation and audit system
- Set targets that need to be achieved
- Develop monitoring and evaluation tools
- Set a clear job description on information collection and processing

Stage 5. Develop culture of quality data generation (inputs), conversion (process), outputs, and information use

- Stage five is about the actual implementation of the project, which is information inputs, process, output, feedback and utilization
- At this level the organizational support structure, information infrastructure and capacity building are adequately established
- The information collection tools and contents (minimum data set for mental health) are designed and developed, and distributed to the necessary healthcare providers, pilot tested and revised as necessary
- Manuals for the use of technology and tools are developed and distributed to the necessary healthcare providers
- Monitoring and evaluation tools and plans are developed based on short-, medium- and long-term goals.
- Use the principles of implementation, i.e. from simple to complex. Meaning start with simple information management system and gradually develop on the success
- Continue on-the-job training and update the staff with new evidence and technologies
- Create collegiality and an enabling, conducive environment for all staff to work as a team, because an information system is teamwork.
- Conduct process monitoring and valuation, and analyse threats; adjust/solve problems
- Establish effective feedback and reward system
- Periodically modify the tools as the need arises or to meet the dynamic situation.

4.10.3 The prescriptive statements of the framework

The five main prescriptive statements that support the implementation of the framework within the specific context of this study are outlined in boxes 1, 2, 3, 4 and 5.

Box 1. Organizational support structure

This section of the statements of the framework addresses the enabling environment that determines information processing and utilization. Organizational structure is the key factor in developing a HIS. Organizational structure involves leadership, human power, finance, policy guidelines, technical and behavioural factors. The behavioural factors include knowledge, skills, attitudes, value and belief system; and the technical skills are the technologically skilled human resources. The behavioural factors have direct impact on the process and outputs of information processing, while technical and organizational factors have both direct and indirect influence on the information processing and outputs.

1.1. The quality of information processing is determined by its organizational structure (leadership, skilled manpower, finance, technical, and behavioural factors); therefore it should be addressed to minimum standards mutually agreed upon by the stakeholders for an effective D MHIS.

1.2. The data collection and processing should meet the needs of mental health information users; hence the involvement of community and stakeholders in the design and implementation of standardised information collection tools and information content is key.

1.3. Developing a health information culture, such as knowledge, skills, attitudes, value and beliefs of the staff, is very important to enhance the quality of information processing, ownership and utilization; it is also important to enhance two-way information flow, vertically between health workers and higher management and between the health facility and government, and horizontally between other health facilities.

1.4. The information process requires indicators, data collection, analysis, quality checking and feedback. The outputs are production of information, dissemination, giving feedback and use. Therefore, ensure that the organizational structure has all the supportive mechanisms for the success of these information processes. For example, it requires the right person for data management, who can work with health providers at PHC level; it is essential to establish a leadership/management system that promotes and is dedicated to developing the culture of quality information processing that improves the healthcare system.

1.5. Create a technically competent environment (skilled personnel and relevant technology) that improves data collection and validation system at each health facility level, that determines the relevance, completeness, adequacy and accuracy of data and timely reporting.

1.6. It is essential to establish a mental health information database within the integrated DHISs at each district community mental health facility for data storage, analysis and utilization of information. The community mental health database feeds into the DHIS, and to provincial and national mental health information databases. This system should not be treated in isolation, but should be integrated into the PHC database systems.

1.7. Quality health information processing requires sustainable funding; therefore ensure adequate allocation of budget for the DMHIS development.

Box 2. Information infrastructure and networking for DMHIS

These statements are targeted at the information infrastructure required to establish a DMHIS within the context of the study. In the current state the district community health services in South Africa use mainly manual/paper-based information collection and processing, and use both manual and electronic for the information reporting system. Based on the consensus of representatives of community and stakeholders, a hybrid (manual and electronic) information system should continue for data collection, processing and reporting, while ensuring gradual transformation of the paper-based information processing into a complete electronic data collection and processing system.

2.1. The use of ICT has the potential to enhance data collection and improve health information flows and data quality. Therefore, electronic data collection and processing should be seen as speeding up the quality data capturing process and compensating to some extent for the existing shortage of staff.

2.2. District community mental health care is the first level of care for data collection from the community; it is a prime opportunity to use innovative ICT tools to collect and integrate data from these levels to other levels of the health system.

2.3. Design data flow structure and strategies that link community, health facility and the government.

2.4. As investment in adopted technology improves, establish a referral monitoring computerised system and link between information system and quality of care. This will facilitate control of the

movements of person with mental condition between first-, second- and third-level hospitals and across districts and provinces.

2.5. Ensure that an organizational structure and support system is in place with full ownership and responsibility for sustainability and effective development of the MHIS.

Box 3. Capacity building programme in information system

Quality data processing is teamwork, it requires competent data collectors, processors, analysers and those who are able to change the data into useable form; therefore staff should be empowered with knowledge and skills in HIS in order to achieve the desired goal.

3.1. Capacity building enhances values and beliefs among members of the organization towards th HIS and can accomplish organizational goals and mission.

3.2. The internal practising environment within the district health system, such as patient information recording, processing and utilizing, is an expanded scope of practice of the profession; this needs a capacity building programme for practising staff and those entering the nursing profession. Therefore, in-service training and a certification programme must be strengthened on the use of new technology, information management, and improving the quality of information available for effective decision making in the healthcare environment.

3.3. The gaps created between the training institutions and health system needs lead to misinformed policy decision making, poor health system outcomes and negative impact on the health status of the individual. Therefore the basic nursing education system needs to relook at introducing an innovative method of teaching nursing informatics that is adapted to the emerging needs of the country's HISs.

3.4. Competent nurse informatists at first health facility level plays a significant role, not only in facility management and disease monitoring, but also in determining health interventions and services. In addition, the increased complexity of health problems in a country requires an advancement in medical and nursing sciences. Therefore higher nursing education institutions in South Africa need to respond positively to the needs of those technological changes in order to produce

competent nurse informatists who are able to function effectively within IT and for effective disease monitoring and intervention community services.

3.5. Advancement in the HIS implies not just an improvement in technology, but also commitment to use the HIS and evidence-based decision-making exercise. This in turn requires effective leadership and comprehensive training at all levels of the health system

3.6. Staff empowerment has a significant role to play in changing people's performance and attitudes; it provides them with ownership, responsibility and accountability; therefore, for the ongoing technical and training support, sustainable funding support should be ensured from government.



Box 4. Community and stakeholders' participation in design and development of information collection tools and content

For the purpose of this study 'community' represents consumers (patients, family members), community leaders, healthcare workers (PHC nurses, psychiatric nurses, and psychiatrists), information clerks/officers and PHC facility managers. 'Stakeholder' represents state, regional and local health departments, chief information officer, mental health superintendent, mental health board, eHealth and health informatics organizations and groups, NGOs, policy/decision makers, researchers in the field; higher nursing and medical training institutions, nursing and medical councils, community organizations, pharmacy departments, ICT organizations and support groups. 'Consensus' involves all representatives of the community and stakeholders. 'Information users' include healthcare providers, patients, patients' family/caregivers and decision makers. The needs for information should be identified and defined clearly at consensus level. Involve the needs of the community in the design and development of information collection tools and content.

4.1 A consensus-based MHMDS should be established by identifying appropriate information required at different health administrative levels, e.g. district community mental health services.

4.2 It is essential that the mental health indicators should be understood well by all data collectors and information users at district community mental health services level.

4.3 Ensure availability of the data collection tools/forms at all times and at all level of mental health facilities. Transform the manual data collection tools into an efficient and sustainable electronic recording system.

4.4 The data collection tools should be purpose-driven and acceptable both at national, provincial and district health administration levels as well as at first-, second- and third-level healthcare facilities.

4.5 Periodically assess the performance of the tools and modify as necessary.

Box 5. Develop the culture of quality information processing and utilization at health facility level

This section provides statements that encourage and transform the capacity of each health facility to process quality information and develop the culture of information use in order to plan preventive and promotive measures of the community mental health and improve the health system.

- 5.1 . Improving the quality of data collection is a crucial step in creating a health system, informing effective decision making and better healthcare outcomes. Ensure data collectors at each service point to value and own the quality of data.
- 5.2 Improved timely feedback and an incentive system could motivate and encourage data/information collectors and processors to achieve quality information processing and utilization.
- 5.3 Adequate and appropriate information should be provided to empower the community and persons with mental conditions about the mental illness, treatment, side-effects, and relapse symptoms. Wherever possible promote mobile health, for example as a reminder of pills and follow-up appointments. Evidence has shown that an increasing number of patients are getting information and answers about their health problems on the Internet; therefore promoting electronic mental health care is advantageous to those with access to the Internet.
- 5.4 The quality of information processing outcomes is determined by its inputs; therefore ensure the right inputs (organizational structure, financial, technical and behavioural) and it should be well understood and addressed by all stakeholders.
- 5.5 Feedback is a key process to identify and solve problems to improve quality information processing. The health management team should provide regular feedback to the mental health providers in terms of the analysis of results of the data and effective planning and use of information.
- 5.6 Developing the organizational information culture and values could assist in processing quality information. Enhance the development of the organizational information culture and values in each district community mental health facility.
- 5.7 Understanding of the indicators reduces duplication of data processing; therefore, all data collectors and processors should be trained about indicators.
- 5.8 Patient data/information collectors' knowledge and technology skills boost their confidence and motivation level to improve the quality of information. Regular updating of patient data/information collectors' knowledge and skills through in-service training is essential to keep up with the current evidence and technology.
- 5.9 Health workers that are competent in the information system are key role-players for quality information processing; therefore all health workers should be trained in information competency.

5.10 Evidence has shown that systems which use a 'bottom-up' community approach to data management are more effective than those data sent directly to higher level. Therefore empowering health providers at health facility level is crucial to processing and utilizing the data.

5.11 The first-level health facility point of care is a primary opportunity to promote a culture of information use to improve care and encourage demand for quality information. Therefore, establish basic grounds for quality information processing and utilization at community health facility level.

5.12 Regular monitoring and evaluation using data ensure the appropriateness of the services and help assess their quality and effectiveness, both at lower and higher level, and to track the programme performance and changes.

4.10.4 Potential benefits of implementation of the framework

The potential benefits of an integrated framework for a DMHIS include:

- Facilitation of effective and quality information collection and processing and an improved feedback system
- Routine measurement and monitoring of mental healthcare outcomes
- Electronic transmission of clinical messages to other health workers/administrative staff and the national HIS
- Clinical audit outcomes of quality of mental healthcare
- Establishment of data bases and research hub centre
- Clinical administration, such as monitoring and balancing caseloads
- Service planning by facility managers, district health managers and provincial health managers
- Contact monitoring and patient movement control across provinces and districts
- Comparison between activity levels of providers
- Planning mental health services by executive mental health planners and NHS.

4.11 Phase four: Experts' validation of the framework

The experts reviewed the framework based on its suitability and applicability for the intended purpose, from the local district mental health service context, local political and resources perspectives. The experts also looked at the local needs of the framework. They evaluated the framework based on the components, content and structure of the framework and list of the prescriptive statements as outlined in Boxes 1–5.

The consensus agreement form (see Appendix 6) was sent with the final draft of the framework. The expert participants had four options to choose from (a = Agree with statement; b = Modify the statement; c = Abstain, go with other's decision; and d = Delete the statement). The consensus agreement instrument provided an opportunity for the expert participants to decide on each of the statements of the framework. Therefore, the final part of the framework was validated through experts' consensus agreement. The following are the results of the experts' comments and suggestions. All relevant comments and suggestions were addressed in consultation with the research supervisor.

The expert participants' consensus ensured coverage of areas that were not addressed, and furthermore suggestion or any concerns raised by them were accepted and addressed accordingly. More than 87% of the participants fully agreed with the statement of the framework; 5% abstained on a few prescriptive statements, 4% suggested some modification on a few prescriptive statements, and another 4% suggested deleting the statement, and of these about 1% gave a replacement statement.

Decisions were made on the suggestions to modify and delete the statement. Thus, four statements were modified as this required minor changes and the context was not changed because of the modification. Comments on language were accepted and the document was edited by a professional language editor.



CHAPTER FIVE

SUMMARY OF FINDINGS AND DISCUSSION

5.1 Introduction

This chapter presents the summary of the findings and discussions of the study. The chapter is organised into three sections: the first presents a summary of the findings as applicable to the intervention research design and development model; the second discusses responses to the research questions; and the third and final section presents the contribution of the study.

5.2 Summary of findings informing the development of the framework

This section presents the summary of the findings. The study was guided by the intervention research design and development model of Thomas and Rothman (1994). The outcomes of this intervention research were development of a framework for a DMHIS. The different phases of the intervention research model were conducted step by step as applicable to the study.

The first phase was identifying problems areas (gaps) in the context of the study. This was conducted using interviews and document analysis. Five major problems areas were identified from the phase one study: lack of standardised information collection tools and contents; poor information infrastructure; poor quality of information processing and utilization; inadequate knowledge and skills in information systems; and insufficient allocation of resources.

The second phase of the study was conducted using a comprehensive systematic review to extract successful functional elements, which were: community and stakeholders' involvement; information infrastructure suitable to the local context; organizational support structures;

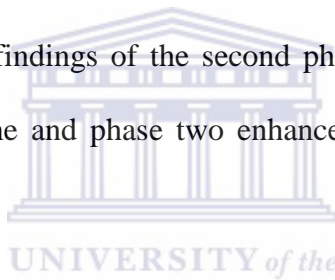
capacity building; and information inputs, process and outputs. The objective of the systematic review for this study was to identify evidence-based successful functional elements to address the problems (gaps) identified during the first phase of the study. A matrix table was developed to show how each of the successful functional elements addresses the identified gaps from phase one. Concept identification and concept development linkage were conducted. The concept development and synthesis enhanced development of the higher-level concepts, which are the anchors for development of the framework.

Phase three was the design and development of a framework for a DMHIS. This includes identifying problems, early design and development, and formulating initial proceduralization of the framework (including prioritization of the list of activities, practice principles) activities, and prescriptive statements with a list of instructions to support implementation of the framework. The draft of the framework was sent to experts for input. All relevant inputs were incorporated into the development of the framework and sent back to the experts for approval. All of them accepted the framework, with minor additional changes. The third draft of the framework was presented to the mental health panellists at the HISA conference. All relevant comments and inputs obtained from the panellists were incorporated into the final draft of the framework.

Phase four was validation of the developed framework by experts from different disciplines (see the background of the experts in Chapter three, section 3.8). The final draft of the framework was sent with a consensus agreement form and consent registration form. The experts reviewed the framework and completed the consensus agreement form with minor comments, suggestions, abstention, modification of statements and issues of language editing. There was no comment on deleting any statement. Action was not needed on the abstention parts of decisions by the

experts; however, action was taken to work on modification of a few statements and language editing. The complete result of the experts' review was presented in Chapter four, section 4.10.5.

As indicated in Chapter four, the analysis of the study was guided by the research questions. Those who had similar interview questions were grouped together during the analysis, for example facility managers, mental health nurses and information clerks. The data obtained from FGDs with caregivers and individual interviews with other caregivers and stable persons with mental conditions and document review were analysed separately. The findings from the different groups were synthesised together during concept identification and concept development. The concepts developed from the findings of phase one of the study linked with the concepts developed from the findings of the second phase (systematic review study). The concepts linked between phase one and phase two enhanced the development of higher-level concepts, as indicated earlier.



The multiple method of data collection helped to strengthen further the main themes which emerged. The discussion section sought to explain the linkage of the key findings and relationships with the wider literature evidence. Therefore a comprehensive discussion is provided regarding the five areas identified in the study. The findings of the study showed some aspects of consistency with the literature findings in many parts of the world, and thus there was no finding that was unique to South Africa. Below are discussed the responses to the research questions.

5.3 Responses to the research questions

In this section the responses to the research questions are discussed. This section evaluates whether the research questions were answered by this study or not, and also discusses the findings in relation to wider studies in the literature reviewed.

Research question 1. What are the experiences of mental health nurses, facility managers, information clerks, caregivers and stable persons with mental conditions in the DMHIS?

The response to this question was obtained from interview participants and FGDs. These were: s follows: lack of standardised information collection tools and content (minimum data set for MHIS); poor quality of information processing (manual-based information recording and processing, inconsistencies and inaccuracies in recording information, poor validation and feedback system, poor patient information sharing and support system); and lack of adequate information competency among the staff. Findings from the document review were found to be similar: inconsistencies and inaccuracies in information recording and reporting. Thus the document review results are discussed together with information processing. Key responses are discussed in detail below.

5.3.1 Information collection tools and content

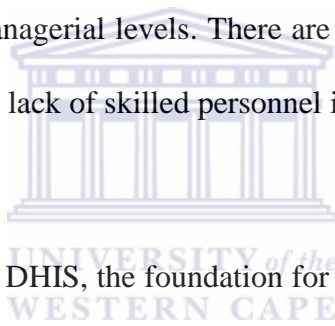
The themes information collection tools and content were combined because the content of information is determined by the information collection tools designed to collect the intended content. The study identified information collection tools and content to be a common problem across study settings. For example, there were no standardised information collection tools and content for mental health in the district health system in the context of the Western Cape, South

Africa. The study also demonstrated that the content of the mental health information collected at district mental health services does not meet the minimum data set standard and is not adequate enough for the decision-making process in planning mental health services.

This finding is congruent with those from most developing countries, where the routine HIS do not provide the information needed to improve health system performance (Aqil *et al.*, 2009). Within the context of this study it was identified that there was lack of knowledge and skills at facility managerial level to think and look beyond the headcount and develop further indicators, and also a lack of community and stakeholders' involvement in the design and implementation of mental health information collection tools and content. These findings are congruent with those of Shaw (2005), that, the use of headcount indicators is to improve service delivery, which often leads to development of more indicators which bring more data; and Odhiambo-Oteino, (2005) states that the DHIS has failed due to lack of involvement of the health managers and health workers in the design and implementation. Furthermore, Garrib *et al.* (2008) note that data should meet the needs of the operators and users. Sommerville and Sawyer (1997) reported that the reason why most information system projects have failed was due to failure to meet the needs of their users. This is also supported by RHINO (2006) who state that community participation in determining information needs and design are essential for the success of HIS.

The needs of the users can only be understood through involving them in the design and implementation phase. Thus the components of the framework developed in this study address this issue (Chapter four, section 4.10.2, Box 4). In South Africa the DHIS data collection tools and content are designed and developed at national level, and instructed down the hierarchy for implementation. Involving the operators, community and users from the lower levels in the design and development and implementation of information collection tools was not considered.

The data collection tools and content for district mental health services is integrated in the DHIS routine data collection system. The current state of mental health information collection is limited to only one element (the total number of mental health visits per month). Research evidence has shown that standard mental health information collection tools designed to collect patient information should include the following: the characteristics of the patient (such as socio-demographic status, the nature and extent of the problem), the different interventions given to patients; health and local organization involved; and the change in patient condition over time (Australian Institute of Health and Welfare, 2012; Health and Social Care Information Centre, 2012). However, the reality seems to be that no one is interested in using the mental health data, both at lower and higher health managerial levels. There are reported problems of managing the information at national level due to lack of skilled personnel in processing the information (DoH, 2011).



In the context of the South African DHIS, the foundation for a MHIS is yet to be developed. The WHO's (2005b) MHIS guidelines indicate how and what to collect for routine service reporting, special programme reporting, administrative reporting, and vital registration reporting. Within the context of this study, in the reporting of headcount it was identified that there were no clear guidelines; for example, one particular patient may visit the same health facility two to three times per month depending on the nature and severity of the problems, and this particular patient would be reported twice or thrice per month, while in another health facility the same type of patient would be reported only once per month (even if visiting several times in that month). Thus, guidelines on how to collect and report the headcount are essential.

In this regard, the headcount reporting does not give the actual figures of mental health patients in South Africa. It also cannot indicate which type of members of the population are affected by

the disease more, and from which geographical location. On the other hand, it was realised that the requirements for mental health services were not identified. Therefore, identifying and defining the requirements are the prerequisite for an effective information system. Studies have reported that a great number of information systems have failed as a result of wrong requirements (Mursu, Korpela & Soriyan, 2004). Requirements are the building block for a successful and appropriate information system. Good requirements are expected to be verifiable, unambiguous, complete, consistent, concise and traceable, implementation-free and with a unique identifier (Young, 2002). In view of this, the statement of the framework developed in this study emphasises the need for identifying and developing appropriate requirements with participation from the stakeholders (Chapter four, section 4.10.2, Box 4, statement 4.3).

In this light it is essential that appropriate requirements are gathered and analysed based on the needs of users, the community and stakeholders, and that the requirements are properly defined and the decision is made as to what the system must do and not do. The international standard for designing information collection tools and content can be adapted to the local context to develop the minimum data set for a DMHIS.

5.3.2 Information processing

The study identified that there was no structured information processing system that would ensure the completeness and accuracy of information at health facility level. For example, there is no skilled person assigned to do verification and validation of information. As a result there were inaccuracies in capturing and processing patient information. In this vein, Omar *et al.* (2010) and the WHO (2004 b) have similar findings that indicate a lack of sufficient and accurate information upon which to base policy formulation. The authors further illustrate that the lack of

data on mental health services at PHC level is attributed to the lack of mental health indicators in the health management information system. The findings in this study also concede that collecting poor-quality information has an impact on mental health service delivery. It affects planning, budgeting, and preventive and promotive aspects. Furthermore, the study identified that the current state of mental health information collection and processing does not reflect the patient situation and service provision. These findings are congruent with those of Karkkainen and Eriksson (2003), that is that information collected from patients is not always checked as to whether the information actually and completely reflects the patient situation. This is also substantiated in a study on nursing records, both manual and electronic, which refers to completeness but does not address the accuracy aspect of the data (Karkkainen & Eriksson, 2003). Studies have highlighted how perspective, completeness and correctness are conditions for data accuracy.

There was a concern by some facility managers about inadequate knowledge and skills of the staff in collecting and processing quality patient information. The staff do not understand the way in which the information being collected and processed has an impact on the outcomes of service delivery. Although no study has been conducted to determine the effect of lack of appropriate information on continuity of care in South Africa, previous studies have shown that a significant number of patients discontinued their treatment due to lack of appropriate information and communication, which resulted in a high rate of relapse and readmission, patient dissatisfaction and poor healthcare outcomes (Van Walraven *et al.*, 2002; Moore, Wisnisky, William & McGinn, 2003). In addition, the literature identifies that incorrect information is sometimes recorded into discharge communication, and is rarely questioned once documented as part of the medical record (Adhiyaman *et al.*, 2000; Bruffaerts, Sabbe & Demyttenaere, 2004).

The findings of this study show that lack of knowledge of staff members creates indifference concerning the accuracy of data input, and utilization. In this vein is very important to empower staff in the information management system. Thus the anchor of the framework developed in this study emphasises the importance of staff empowerment (Chapter four, Box 3). The perception of some facility managers that inaccurate information recording and processing has no effect on service delivery is a reflection of a lack of understanding about the effect of information in general. Therefore it is important to reiterate that many research findings discussed in the literature indicated that inaccurate recording and processing of information has an impact in many ways on how we respond to the mental health needs in the community.

The study also identified some attitudinal problems among some of the health workers about collecting patient information for reporting. For instance, on the one hand the health workers do not understand the purpose of collecting and reporting, and on the other hand they do not receive feedback and do not see any changes brought about by the data that were sent to higher offices. This is one of the factors that actually demotivates them from recording and processing patient information for a report. The poor quality of information is also associated with inadequate knowledge and skills about information recording and processing. The study also identified that some facility managers have poor understanding of the value and benefits of information in the decision-making process as well as in designing effective service provision.

An information audit system is one of the most important tools in information processing with regard to identification, costing, development and rationalization of information resources and information services (Dubois, 1995). At the time of data collection for this study there was no audit system for monitoring and evaluation of the quality and efficiency of the information systems. Although there was some sort of verification and/or validation of data conducted by

facility managers, it was not properly structured. Validation is conducted before the data are reported to the substructure office. Some of the facility managers also believe that the validation process at facility level was superficial. However, the data validation process seems more structured at the substructure office. The main purpose of data validation was to check whether the headcount was too low or too high; this was compared against the target set for a facility for the amount of patients that must be seen each month. This is also compared with the previous month's report for discrepancies, and reasons must be given if the record is too low or too high. In general there were no standardised validation system to monitor the quality of information processing and its efficiency.

Feedback is an important aspect of the information system to improve the quality of work and performance. The South African DHIS policy stipulates how feedback should be provided on analysed data to health facilities for use in planning and programme performance (DoH, 2011). The findings of this study revealed that feedback on analysed data was not provided to health workers on data that had been sent to a higher level. It was also noted that data flows one way (from the bottom up); the purpose and outcomes of the data reported were not known to the health workers. Nevertheless, the facility managers have quarterly meetings at substructure office to receive the dashboard feedback. The focus of the quarterly feedback for facility managers is to compare the work of one facility with another health facility in terms of achieving the set target, and sharing experiences from those who have done well and those who have not. However, even the results of this quarterly meeting with substructure office do not filter down to the health workers who are the actual collectors of patient information, as to whether their work is reflecting or not and/or in terms of achieving the stated target. In this study it is also reported that health workers only receive instructions from higher management level whenever there are

new tools that need to be implemented, to have errors corrected in the reports they sent, and so on. Moreover, internal feedback within the facility on the collection and processing and utilization of information is non-existent.

It is important to realise that feedback plays a significant role in improving data collection processes and utilization as well as in motivating data collectors and those who process the data. Even though the existence of problems in processing quality information, validation and feedback was acknowledged in the DHIS policy document, it had not been addressed adequately. Previous research studies have affirmed that organizational feedback is the most important engine in driving organizational work (Cook *et al.*, 2006). The authors further illustrated that understanding the role of feedback in an information system requires a holistic approach, because of the nature of information characterised by the interaction between people, software and organization. It is not only top-down feedback which is influential in modelling health service activities, but also internal feedback within an organization is very important. Therefore, in a HIS that is typically designed for extraction of information to report to the higher level, the benefits of this information are rarely available to the service providers, their patients and frontline supervisors. Therefore, incomplete and poor feedback contribute to negative implications of the outcomes of the mental health service. Although, there is no information system specifically for mental health within the context of this study, it is hoped that staff's active involvement in developing an MHIS for recording, processing and utilization of information ultimately benefits of mental health community.

5.3.3 Information competency

The knowledge required to use the basic functions of most of the software available today is limited to a few clicks of the mouse at PHC providers' level. The findings of the study indicate that there was a lack of knowledge and skills in information collection and processing among the facility managers, clinical staff and information clerks. It was realized that there is a need for staff development to equip such personnel with knowledge and skills in information systems and psychological readiness for effective implementation of DMHIS, which would have an impact on the quality of information processing. It was also highlighted that data processing using technology requires more than basic knowledge and up-to-date information to manipulate the data.

Within the context of this study, addressing the knowledge gap in terms of understanding the value of information and its impact on the quality of patient care plays a significant role for effective implementation of an information system. Hence the components of the framework developed in this study are committed to addressing the issue (Chapter four, Box, 3). Furthermore, it is emphasised that at the time of this study there was no capacity building programme for the staff with regard to an information management system. Therefore, in this study it was realized that there is a need for policy guidelines that enhance capacity development in the facility for effective and efficient implementation of information. Additionally, there is a need to dedicate time to learn the basics of computers in order to fully take advantage of the benefits of modern technologies and continue to improve skills development. It was therefore recognised that computer proficiency is necessary in many areas of community clinics, administration, clinical practice, patient data management as well as patient education.

With increased perception of computers as information management tools it is possible that the health facility managers should develop formal computer training programmes and provide effective in-service computer skills training for the staff. The aim of training should be to empower facility and district staff to use locally generated information to improve coverage and quality of PHC services. On one hand, it was found that the younger health workers already have computer skills and are using them more often and effectively even without specific computer instruction, and on the other they have more formal training at higher institutions. Computer skills have been described in the literature as being essential for professional success of staff and thus, since health workers are expected to perform a number of tasks that require frequent use of computers in their daily activities, computer skills are essential to them (Heeks *et al.*, 2004; Modai & Rabinowitz, 1993). However, technology can also create hazards in health care due to inappropriate usage and functional errors (Heeks *et al.*, 2004; Southon, Sauer & Dampney, 2001). It is, therefore important to encourage higher training institutions to incorporate an IS curriculum into their undergraduate nursing and medical students' training programme at higher training institutions.

Research question 2. What is the infrastructure for information processing and flow at DMHIS?

The study identified that the main information infrastructure was poor and fragmented and patient information was collected and processed by manual means. The technological infrastructure such as computers and networking was not available for information processing. Therefore information flow and networking was fragmented. This is discussed below.

5.3.4 Information infrastructure

The study identified that patient data collection, processing and reporting was conducted using manual methods. Patient referrals and post-hospital discharge summary communication systems

to the PHC staff are weak and mostly use postal mail, the postman or patients themselves. It was realised that this patient information communication usually gets delayed or lost before they reach the designated healthcare provider. Although no study was found in South Africa on how many of them are affected due to poor discharge/referral communication, the study by Buffaerts *et al.* (2004) indicated that transition from hospital to community care has exposed deficiencies in service standards and gaps in treatment strategies and protocols, and may lower the quality and post-hospital continuity of care, particularly in people with severe mental illness. The discharge summary is a vital tool for information transfer, and telephone calls and post-discharge support groups have a significant effect in improving patient condition and reducing readmission (McIntosh & Worley, 1994).

Global experiences demonstrate that IT has the ability to assist in reducing the inefficiencies of the manually driven information process, lowering the transaction cost, improving the capacity of the health system to manage patient care and data processing, and ensuring the availability of information to support more efficient care and enhanced security and confidentiality of patient data (Cline & Luiz, 2013). Furthermore, Williamson, Stoops and Heywood (2001) note that the implementation of an information system is a vehicle for the delivery of accountable health services and demands organizational change within a framework of human resource development and technical support. The effective use of IT has enormous potential as a tool to increase information flow and the dissemination of evidence-based knowledge and to empower citizens. Hence the components of the framework developed in this study which are dedicated to this (Chapter four, Box 2).

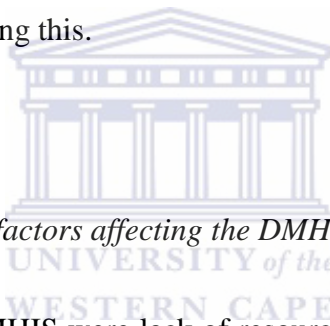
The WHO (2004b) reported that in some developing countries health care workers in remote areas use ICT to discuss diagnosis and treatment for the outbreaks of diseases, and ICT can also

support the delivery of capacity building and knowledge for health workers. While this is encouraging, the findings of this study highlight that in spite of all the potential which IT has to facilitate work and improve the health status of the individual person, there was no information infrastructure such as computers, skilled personnel and Internet at the district mental healthcare services, even in the Metropole region of the Western Cape. In addition, the lack of technologically skilled and dedicated personnel in the mental health field has hampered the use of ICT for the development of mental health services.

The statement of the framework developed in this study attempts to address this (Chapter four, Box 2, statement 4.5). Thus the manual, paper-based processes remained the main resource of mental health patient data collection and reporting, delivering patient care, and fulfilling administrative tasks. At some district health facilities computers are available for administrative use at the reception and in some facility managers' offices. It was observed that some of them have started sending their reports using both manual and electronic methods; however information infrastructure such as electronic data bases for storage of data and software for data processing and disseminating information as well as skilled manpower in IS and networking are very limited in the district mental health system.

The e-Health Association (2013) has stressed the need to transform the manual-based environment to one where healthcare providers and health managers have access to reliable shared health information in real time across geographical and health sector boundaries. Networking and information flow connect the community, health facility and government together. Nevertheless, the major concern of confidentiality and safety of patient information needs to be addressed adequately. It is therefore important in addressing the issues throughout the statement of the framework developed in this study (Chapter four, Box 2, statement 2.3).

In any organization information infrastructure has the ability to process information and make decisions, the capacity to monitor the internal and external situation and quickly respond or address the problem (Darbuceana & Fox, 1994). This study revealed that mental health is still being treated in isolation at the corner of the district health system; no attention seems to be given to district mental health services, especially by facility managers and district health system programme leaders. Awareness about mental health should help to change the attitudes of some administrative staff, district managers and programme directorates. It is also important to emphasise the need for developing technical and skilled human infrastructure for effective mental health services within the integrated DHIS. The component of the framework in Chapter four, Box 3 is dedicated to addressing this.



Research Question 3. What are the factors affecting the DMHIS?

The major factors affecting the DMHIS were lack of resources (human, technical and financial), inadequate knowledge and skills, and neglecting mental health (for example, mental health is not part of the eight divisional priorities in the district health system). The inadequacy of knowledge and skills identified in the question were addressed under information competency, and therefore are not discussed here.

5.3.5 Resources (human, technical and financial)

It was identified in the study that one of the main challenges the primary mental health care facilities experience was inadequate supply of human and technical resources. This was not mainly due to budget constraints, but also negligence towards mental health. It was realized that

the resource allocation for mental health development was not equitably distributed, which has resulted in poor outcomes of mental health services and dissatisfaction among mental health consumers and providers. It was also understood that knowledge alone cannot do anything without human and technical resources. In this regard activity theory explains the interaction of human and computer as mediator (tool) (Engestrom, 1999a; Kaptelinen *et al.*, 1995). Therefore knowledge is the means to create the interaction between the subject and the tool to produce the desired results or products.

Similarly, within the context of this study, the availability and effective use of human knowledge and skills and technical resources could lead to quality information processing and decision making. However, the study identified that constraints in the human and technical resources have impacted negatively on the quality of information processing, planning and decision making for mental health service development. It follows then that technical and human resources development require an adequate and sustainable budget, hence the components of the framework described in Chapter four, Box 1) are the primary step that needs to be addressed in establishing a district MHIS.

Organizational structure, which includes human, technical and financial resources, is the basis of the framework components developed in this study. Aqil *et al.* (2009), Kamadjeu *et al.* (2005), and Odhiambo-Otieno (2005) state that inadequacies in human, financial and technical resources, and low management and leadership support affect the performance of routine information collection and processing systems. It is, therefore essential to realize that it is a commitment that one can make for the betterment of society. In other words, it is the question of ‘do we want to transform our health system into effective and efficient health services with measurable outcomes and health status of the society or not?’ If the answer is yes, then dedication and

commitment of the resources is the first step we have to take to move forward to the next step, and transforming the fragmented, manual-based patient information processing into an effective and efficient information management system.

Research question 4. What are the successful functional elements required for the DMHIS?

Research question 5. What framework would be suitable for the DMHIS?

Research question 4 is both a response to the systematic review questions and research question 5, building the framework, is also answered in the systematic review question. Therefore the two are answered together.

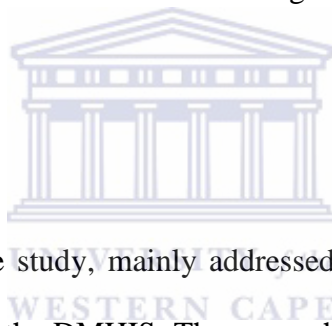
This research question was addressed by conducting a systematic review in identifying a solution for the identified problems during phase one. In this case the successful functional elements were extracted and categorized under the central themes. The categorized themes were synthesized and developed into five major successful functional elements that were in turn used to develop the framework. These are: organizational support structure, information infrastructure, capacity building, community and stakeholders' participation, and information inputs, process and outputs. The information matrix table (Table 4.13) has explained how the five key intervention areas identified from phase one of the empirical study can be addressed using the five functional elements that were extracted and synthesised from the systematic review. Therefore, the building blocks of the framework are the five anchors that were developed through the synthesis of the systematic review method (See Figure 4.3).

As indicated in Chapter four, under section 4.10.1 in implementation of the framework, there are five stages or procedurization processes in prioritizing the activities. These could assist anyone implementing the framework on where to start and how to proceed. The prescriptive statements

that are described in the five boxes (see section 4.10.3) are the guidelines for the implementation of the framework.

5.4 Contribution of the study

In this section the contributions of the study to the general body of knowledge are presented. The first contribution is the development of the framework, which has two specific parts to it, that is, theoretical and practical contributions. The second contribution of the study is methodological (see 5.4.3). The theoretical, practical and methodological contributions of the study are highlighted below.



5.4.1 Theoretical contribution

The theoretical contribution of the study, mainly addressed to the research community, is the development of the framework for the DMHIS. The research community in a broader sense, the implementers, decision makers and stakeholders may have an interest in the results for research on HIS, particularly DMHIS in developing countries and also for those who are interested in developing and modelling software for mental health care in developing countries.

The other contribution is that the research increased understanding of the enabling environment required for an MHIS as a whole. The literature reviewed in relation to the research question for the empirical study and systematic review conducted in this study led to the development of a framework in identifying the solution, which is unique to this kind of context. The DMHIS framework clarifies the information system development for community mental health information users. The main aspect of the framework is the key issues of the procedurization for

the stakeholder to act on the framework. What is known in the literature was the framework or model with input, process, output and effect or impact. However, what is new to the framework is procedurization which incorporates an understanding of the basics and requirements of information needs within the context of this study.

This kind of framework with procedures is not available in the previous literature; it is thus new in the context of this study and other similar contexts. Therefore the developed framework is a theoretical contribution of the study within the local context (see section 5.4.4).

5.4.2 Practical contribution

As part of the research results that emanated from different research groups to produce knowledge relevant to mental healthcare practices, the findings of the study and the developed framework are important for both mental healthcare providers and mental health consumers. Furthermore, the findings are important to HIS development organizations, particularly those focusing on developing health IT for developing countries. In addition, the findings are critical for those planning to develop an MHIS for their organizations.

These findings might also be helpful to those wishing to further develop the framework for their own needs and in their own context. Another practical contribution of the study is the procedure developed for implementation of the framework in Cape Town or in other similar contexts. Unfortunately this study was unable to produce users' guidelines due to time constraints. However, it is understood that the user guidelines are very important for implementation of the framework for the MHIS. This also could be one of the areas of knowledge and skills transmission gaps on which other researchers could do intervention research. It also highlights

the need for higher training institutions and stakeholders to match their training needs with the current health services needs.

The practical contribution of the study is addressed to mental health professionals, particularly those working in community mental care settings and possibly also mental health consumers and stakeholders. In this study the consumer community and stakeholders' involvement in the design and implementation of MHIS at primary care level was well addressed. The viewpoint of community and stakeholders' participation and needs assessment are the basis for building an MHIS and modelling the activities to address the needs.

The framework developed during the research was guided by proceduralization for implementation (see section 4.10.1). In this study the framework is the first in its kind to address the mental health community information needs. Therefore the practical contribution of this study is the relevance of the framework and how it can be used by government. This framework can therefore be applied in Cape Town and other places as well. However, the limitation of the framework is that it focuses on situations where very little mental health information exists. Therefore it may not be relevant for others who already have an MHIS in place. Others can evaluate the framework, insofar as they are interested.

5.4.3 Methodological contribution

The main methodological contribution of the study to the general body of knowledge lies in demonstrating how one conducts a systematic review using scarce information resources to respond to the empirical findings such as those found in phase one of this study. From the methodological point of view, systematic review was the best way to address the questions

which arose from the empirical study. However, there was little information available on MHIS in developing countries, with particular emphasis on district health system level. It was difficult to obtain reliable information both at national and international level which was methodologically appropriate to systematic review. After assessing information sources for data that could be relevant for either quantitative or qualitative systematic review, the yield of information was inadequate. Thus there was need for complementary approaches to overcome the challenges. Therefore the researcher used the JBI NOTARI method of critical appraisal to conduct a systematic review on unpublished policy documents, opinion papers, workshops and conference proceedings, or guidelines developed by international organizations, and also obtained a few published materials from qualitative and quantitative studies, although their relevance was minimal. The researcher used mixed methods for critical appraisal of the qualitative and quantitative articles, and NOTARI critical appraisal for text and opinion papers. The researcher then combined the results from the NOTARI systematic review and mixed method of systematic review to come up with common central themes. These themes were central in addressing the empirical findings.

The methodological contribution of this study in this regard is a combination of the different systematic review methods, which enabled the researcher to come up with a solution in the information-scarce field. The results of this methodological contribution obtained an appropriate degree of acceptance for developing a framework for a DMHIS. Combining the different types of systematic review methods, particularly the use of opinion and unpublished documents, is the first of its kind at PhD research level. It is a completely novel and a value-added contribution to the current ways of thinking in terms of the scope of the research method in a limited-resource context.

5.5 Implications for further research

This study recommends the need for further research in areas which were not addressed by the study due to time and financial constraints. The following research areas are recommended for further research development by the researcher himself and other interested groups:

- Further research, implementation and evaluation of the framework by the researcher himself or by any other researchers;
- The link between the quality of information processing and utilization, and the quality of healthcare outcomes;
- The impact of a digital patient information system on the reduction of patient waiting times for services;
- The impact of electronic pills reminder and the reduction of relapses and readmissions of person with mental conditions; and
- A deeper and wider scope of document review.

5.6 Limitations of the study

The study suffered from a number of limitations. Owing to time constraints and limited funding as well as the restraints of a student researcher, it was not possible to involve more research sites in the study and to include more health professionals for a more comprehensive study. Thus the study was limited to a smaller study population from community mental health services and psychiatric hospitals across the Cape Town Metropole area in the Western Cape. Therefore the framework developed may not be applicable to other areas where they may have differently structured or more adequate mental health information resources. The subjectivism of the

qualitative research also serves as a limitation, as the researcher is part of the research instrument; hence the researcher might have missed/overlooked some relevant points or even exaggerated some aspects of some points from the data.

In reporting on the research process there was a scarcity of available information as published original data on the MHIS. Therefore very limited original data on MHIS were used for the theoretical background and systematic review of the study. However, reference to the low scientific value publications, such as policy documents, guidelines, workshop/conference papers and general health information publications, were used. As mentioned in section 5.4.3, the use of these low scientific value publications may contribute relevant information, although they are regarded as low in the hierarchy of evidence levels.

As indicated in Chapter three, sections 3.5.3 and 3.5.4, FGDs were not conducted as originally planned due to difficulties in bringing people together, and the fact that even those who came did not show much interest in sharing personal experiences. Hence the decision was made to conduct individual interviews to cover the remaining part of study. However, the information generated from FGDs could have been more comprehensive and shared common understanding compared to the individual interviews; thus this could be considered as a limitation. The document review process was not deep enough and could be considered a limitation of the study in the sense that a deeper analysis could have produced wider interpretations and results. These are also brought up as an important objective for further research.

Nevertheless, all efforts were made to ensure the rigour of the study, as both empirical and theoretical research on the development of a framework for a DMHIS is important in enhancing the use of technology-assisted mental health care in developing countries such as in the Western

Cape. Further research efforts aimed at implementation of the framework for its practicality requires government support and political will and resources.



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the study on developing a framework for a district-based information management system for mental health care in the Western Cape that was outlined in the preceding five chapters. This thesis has been presented in six chapters. In a nutshell, this chapter highlights some of the central issues raised in the study. Therefore, it is organised according to the layout of the individual chapters of the thesis.

The first chapter provided the background to the study, which included among others the problem statement, significance of the study, its aims and objectives and the research questions. Chapter two was the literature review, which discussed the theoretical background of the MHIS, mental health policy in the context of the IS, and the philosophy of the IS and its development. It also looked at activity theory as the philosophical foundation of the study. Chapter three discussed the methodology of the study, which included three sections. The first section provided the methodological choice and assumption; the second discussed the intervention research design and development model and research processes, and the third discussed the notion of systematic review. Chapter four presented the findings of the study from the empirical and systematic review, development of the framework, procedurization of the framework and prescriptive statement of the framework. Chapter five presented the discussion of the findings and linked them with the framework which was developed. It also presented the findings in relation to the wider literature results; and further provided the contribution of the study to the wider research community, stakeholders and implementers. As discussed in Chapter five, the contributions of

this study are theoretical, practical and methodological. Finally, Chapter six also presents a summary of the research process, conclusions and recommendations.

6.2 Conclusions

The aim of the study was to develop a framework for a DMHIS relevant to the local context. In this regard an extensive literature review was conducted to identify relevant evidence about MHIS, with particular emphasis on a district/community MHIS. The findings from the literature review proved the usefulness of an MHIS through which the consumers have access to efficient and equitable mental healthcare services that initiate quality of care. Furthermore, a HIS ensures high standards in moving between different service providers and continuity of care (Lelliott, 1995), and involves all organizations and resources that focus on improving mental health (WHO, 2005b). The literature review highlighted that problems caused by lack of information lead to inability to undertake rational planning, impede accountability and cause inability to monitor changes. The literature also showed that incomplete and inaccurate information contribute to faulty medical decision making and have an impact on continuity of care, patient safety and patients' and health workers' satisfaction and policy formulation (Archbold *et al.*, 1998; Moore *et al.*, 2003). The literature reviewed also indicates that the South African mental health policy does not incorporate an MHIS.

The theoretical background of information system development as a discipline and as HIS was examined. In this regard the concept of activity theory in relation to research activities and human and computer interaction was highlighted. Therefore activity theory was used as the philosophical foundation of this study. The comprehensive literature review and theoretical background of information systems informed the appropriate choice of research methodology in this study.

The methodology chapter discussed the choice and the underlying assumptions of research methodology and the different competing paradigms, such as positivism, post-positivism, critical theory and constructivism (Guba & Lincoln, 1994). The study employed the intervention research design and development model developed by Rothman and Thomas (1994) to conduct the empirical studies and systematic reviews. This model's research process has six phases: (1) problem identification and analysis; (2) gathering successful functional elements; (3) design; (4) early development and pilot testing; (5) evaluation and advanced development; and (6) dissemination. However, phase five is beyond the capacity of this PhD study, and therefore the researcher used the intervention research design and development model with a slight modification. Hence, for the purposes of this study, while phase one and two were applied as is, phases three and four (design and development) was combined in the process of developing the framework, and then phase four became a stage for validation of the framework and phase five was dissemination of the results (see Chapter three, Figure 3.1). Phase one was conducted through different interviews, FGDs and document review, and phase two, which was gathering of successful functional elements, through systematic review.

In this thesis the experiences of mental health nurses, facility managers, information clerks, caregivers and stable persons with mental health conditions were studied in relation to the DMHIS. The information processing infrastructure and challenges or barriers of DMHISs were also investigated. The different participants' viewpoints were identified and their concerns discussed. The empirical findings presented five key problem areas in a DMHIS in the Western Cape, South Africa, which are a lack of:

- standardised information collection tools and contents,
- information infrastructure,

- information processing,
- information competency training, and
- resources.

The study identified that there were no standardised information collection tools and content (minimum data set for district MHIS) that is agreed through consensus of community and stakeholders. It was also established that the lack of information infrastructure affected the information collection, processing, networking and information analysis and utilization. This in turn resulted in poor quality of information, which affected the mental health planning, budgeting and taking of preventive and promotive measures for the community.

The unavailability of an appropriate information validation and feedback system resulted in unreliable information collection and processing, and lack of motivation from the health providers' side. It was also established that there was a lack of skilled personnel in information processing. The facility managers and health providers had insufficient knowledge about information systems, and there was no in-service training to empower staff with skills in managing the quality of information processing and utilization. Resources such as shortage of health workers and lack of technical and financial resources were the major problems identified by the study.

The in-depth analysis provided a full understanding of the context of DMHIS in the Western Cape, South Africa. Hence the findings informed the research question that guided the systematic review. The systematic review aimed at answering the systematic research question in addressing the identified gap in empirical study. The inclusion and exclusion criteria were applied; subsequently the research question was adjusted to widen the scope, as no relevant articles were yielded. After widening the scope of the research question, few relevant articles

were obtained; however, the evidence level obtained from the few articles was inadequate. Therefore the scope of the search was further increased to include texts and expert opinion papers. In this regard the researcher used the NOTARI JBI critical appraisal method to select relevant text and expert opinion papers. After a full review 5 research-based articles were identified and 8 articles from text and opinion papers, policy guidelines and workshop papers. Subsequently the contextual themes were extracted and the conclusions were drawn from the 13 articles. Thus five key successful functional elements were developed by synthesizing the themes:

- community and stakeholders' participation in the design and development of district information system;
- information collection tools and content(minimum data set)
- information infrastructure;
- organizational support structure; information inputs, process and outputs; and
- staff development.

However, these functional elements are not specific to DMHIS, except the information collection tools and contents (minimum data set and indicators). The researcher used these five key functional elements to develop the first draft of the framework and then external experts in the field, a multidisciplinary team, participants in the study and government representative reviewed and revised the guideline statement. The relevant comments were incorporated and the second draft of the framework was developed and presented to the mental health panellists and information system experts, and the final draft was refined and sent back the panellists and experts for consensus agreement and validation. Subsequently procedurization was developed for use by the government, health workers, individuals and organizations.

One particular policy programme that sought to extend some theoretical underpinnings on HIS was the DHIS programme of South Africa, which registered some success at the beginning of its implementation but was short-lived. However, evidence from several studies, including this one points out that mental health services are inadequately represented. This study has used empirical findings to show that the current DHIS policy is not making the anticipated impact on mental health services improvement.

The theoretical argument for this justification suggests the need for a policy review which will enable diversification to develop an effective and efficient information system for mental health generally, and more specifically for district mental health care.

6.3 Recommendations



Based on the findings of this study, the following are some of the recommendations:

1. This study has shown that the view points of community participations are the basis for information need assessment and modelling activities to address the mental health need of the community. Therefore, the study recommends that there is need for HIMS committees at each district health facility level to be established and to improve the DMHIS. Such committees could enhance and facilitate the development of DMHISs. Therefore a committee should constitute mental health nurses, doctors, health facility managers, information clerks, receptionists, stakeholders' representatives, community and mental health consumers' representatives and head nurses.

2. The study recommends that in order to maintain the quality of mental health information processing and the quality of mental health care, the health facility environment should be adequately prepared to develop a DMHIS.

3. This study has shown that there was lack of information infrastructure, such as skilled personnel in information system, software, digital data base, electronic information processing and networking, storage and analysis; lack of information collection tools and contents that is agreed with the consensus of stakeholders, and unavailability of information validation and feedback systems. These have affected the quality of information processing and furthermore affected the decision making process and delivery of efficient mental health care. The knowledge and skills required for effective implementation of an information system has an impact on the accuracy of information processing; therefore, it is recommended that a continuous staff capacity building programme/career development programme in information system has the potential to produce professionals who are efficient and effective in managing a HIS and to meet the health information needs of the people. Furthermore, there is a need for establishing minimum data set for mental health at different health service level, as well as developing information validation and feedback systems. In addition, the nursing and medical schools should consider incorporating HIS into their undergraduate curriculum in order to prepare would be health professionals.

4. The framework developed in this study was guided by the imprical data inputs and evidences. The framework is the first in its kind to address the mental health information needs of the community; thus, it recommends that the South African mental health policy should be reviewed to include MHIS and to develop the users guide which is very important in the implementation of the framework. The implementation of the framework can enhance the practice of the principles

of information quality, such as accuracy, completeness, reliability, cost-effectiveness, currency, accessibility, and confidentiality and security of patient.

5. The study identified that resources, such as skilled human resources, and appropriate budget allocation were the major problems. Therefore, the government should ensure adequate resource allocation for establishing MHISs at district mental health facility level, and mental health information systems data bases both at provincial and national level.



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Appendices

Appendix 1. Participants' information sheet and consent form



University of the Western Cape

Faculty of Community and Health Sciences

Private Bag X 17, Bellville 7535, South Africa
Tel: +27 21-959 9346, Fax: 27 21-9593432; email. mbimerew@uwc.ac.za

Information sheet

Project title: Developing a framework for a district-based mental health information system

What is this study about

This research is being conducted by Million Bimerew of the University of the Western Cape. You are being invited to take part in the study because (tick one that refers to you): you are (a) Health facility manager; (b) mental health nurse; (c) Information Clerk/officer; (d) Caregiver of mental ill family member; (e) you are stable person with mental conditions.

The purpose of the interview is to learn more about your experiences of district-based mental health information system (capturing/recording, and processing of the data), which include your comments, ideas, opinion and suggestions. It is my hope that the study will determine some benefits for all mental health services at district healthcare as well as to provide adequate and accurate mental health information. At the same time, it is my wish that solution will be sought to address those identified, barriers and challenges. Therefore, I would like to kindly invite you to participate in the study.

What will I be asked to do if I agree to participate?

I will seek your permission to observe you on the ward. I may have an individual interview with you which may last for 40 to 90 minutes and would be conducted at a place and time convenient to you. During the interview, there is no right or wrong answer and you are free to express yourself as much as you can. Your consent will be sought to audio-tape the interview. Later in this study, your views will be sought on draft clinical guidelines that may help in the post-operative pain management you provide or receive. I will also ask your permission to go through your clinical notes on the ward

Would my participation in this study be kept confidential?

Your participation in this study will be kept confidential as much as possible. Your name will not be associated with any experience you share during the study. False names will be used to report findings of the study. Only the researcher will have access to your name when you sign the consent form and this will be kept under lock and key. Also, any information related to you such as the interview transcript will be kept in the form of codes to protect your identity. All data generated in this study will be password protected so that only those involved in this study will have access to it. The computer used for this study will also be password protected.

In case of any report or article from this study, your identity will be protected to the maximum extent possible.

What are the risks of this research?

There are no known risks associated with participating in this study. However, if you feel emotional while sharing your post-operative care experiences, you will have the services of a counsellor without any cost to you. If you also feel any pain or discomfort during the interview, the process will stop immediately and rescheduled as appropriate.

What are the benefits of this research?

You may not derive any immediate personal benefits in this study but the results may help the researcher fully understand issues influencing post-operative pain response and management. It is hoped that in the future, other patients could have improved care from the knowledge gained. Future health care providers would also benefit from clinical guidelines developed in this study in the management of post-operative pain.

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized, it will not affect the care you receive, the care of your relative, or your employment status as a health care provider.

Is any assistance available if I am negatively affected by participating in this study?

You can request for counselling and I will ensure that you receive appropriate counselling at no cost to you.

Audio taping/Videotaping/Photographs/Digital Recordings

This research project involves making audiotape of you. The reason for audiotape is to record all the interview information and transcribe accurately without missing or adding to the original information given by the participants. Only the researcher will access to the identification key/code or password and will be able to link your information to your identity. The audiotape will be locked in the filing cabinets and storage areas using identification code or the information will be transferred into the computer and will be protected with password, in this case the information in the audiotape will be destroyed.

___ I agree to be videotaped/audiotaped/photographed during my participation in this study.

___ I do not agree to be videotaped/audiotaped/photographed during my participation in this study.

In the attached page there are interview questions that will guide you to answer the question step by step.

What if I have questions?

For any further information or clarification, please do not hesitate to contact Mr. M. Bimerew at

Tel. 021-9599346, email: mbimerew@uwc.za.

Private bag X 17 School of Nursing, University of the Western Cape

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please you can contact my Supervisor Prof. Adejumo

Thanking you for your participation

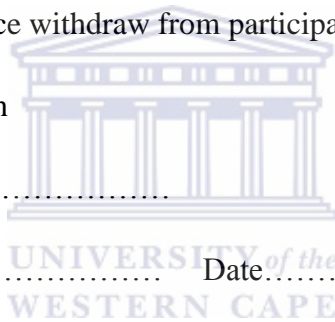
I hereby confirm that I have been informed by the researcher Mr. M Bimerew about the nature, conduct and risks of the study. I have also read and understood the above written information and informed consent regarding the study. I am aware that participating in the study, my personal identity will be kept anonymously throughout the research process and then after in the research report for possible publication in accredited journals.

I may at any stage, without prejudice withdraw from participating in the study.

Thanking you for your participation

Participant's name.....

Participant's signature Date.....



I Mr. M Bimerew herewith confirm that the above participants have been informed and understood fully about the nature, conduct and risks of participating the above study.

Researcher's name.....

Researcher's signature..... Date.....

Appendix 2. Data collection instruments

Individual interview guide with health facility managers, mental health nurses and information clerks/officers

I. Demographic data

First, I would like to know some information about you:

1. Gender

Female	1.	
Male	2	

2. Your age group

20-30yrs	
31-40yrs	
41-50yrs	
51-60yrs	
60+	

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3. Highest qualification obtained.....
4. Name of your institutions.....
5. How long have you been working in your profession?.....
6. How long have you been working in your current position?.....
7. Do you have any training on health information management system?.....
8. Have you ever received standard instruction on how to record and process health information/data?-----

II. Interview guide:

1. From your experiences, can you please tell me what types of mental health information are collected, recorded and processed at your mental health facility?
2. How the information collected is being used in your health facility and by higher organization?
3. Could you please explain the current mental health information flow system?
4. How the existing trends of mental health information systems affect the outcome of mental health services?
5. What are some of the challenges/concerns you have in collecting, recording, processing the mental health information at your facility?
6. In your opinion, what should be done to improve mental health information management system at your district health services?
7. You are welcome to provide more suggestions or comments.

Focus Group Discussions with Caregivers/Individual Interview with caregivers and person with stable mental conditions

I. Demographics

First, I would like to know some information about you:

1. Gender

Female	
Male	

2. Your age group

20-30yrs	
31-40yrs	
41-50yrs	
51-60yrs	
Greater than 60	

3. Highest qualification obtained.....



4. What is the diagnosis of your mentally ill patient/or your mental illness.....

5. How long have you been caring for your mentally ill family member(s) or for your own mental problems.....?

6. How long have you been utilizing this mental health facilities.....?

II. Interview guide:

1. Can you please tell me your experiences about the mental health information or support system you have received at the health facility?
2. Can you please explain any difficulties you have experienced in getting the information you needed to care for yourself/or to your mentally ill family member(s)?

3. How has the existing information and communication with your mental health facility affected the outcomes of your mental illness/ or mentally ill patient?
4. What types of information do you think help most to improve the conditions of mentally ill person? In what way do you prefer to receive the information?
5. You are welcome if you have more suggestions or comments.



Appendix 3. Background of the expert reviewers

Code	Expertise	Institution
R001	1 psychiatric nurses	District mental health services
R002	1 psychiatric nurse	Psychiatric hospital
R003	1 psychiatric nurse	Psychiatric hospital
R004	1 psychiatric nurse	District mental health service
R005	1 psychiatric nurse	District mental health services
R006	1 psychiatrist consultant and Head Psychiatry Hospital	Psychiatric hospital
R007	1 psychiatrist professor	University
R008	1 academic mental health	University
R009	1 M.Tech. IT (Technikon): Academic Information Technology (IT)	University
R010	1 operational manager	Psychiatric hospital
R011	1 mental health and rehab manager	Provincial government
R012	1 academic informatics design	University

Appendix 4. Ethical clearance letter



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OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH
DEVELOPMENT

06 September 2011

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:
Mr M Bimerew (School of Nursing)

Research Project: Developing a framework for a District-Based
Information Management System for Mental
Health Care in the Western Cape.

Registration no: 11/7/17

*Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape*

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A place of quality,
a place to grow, from hope
to action through knowledge

Appendix 5: Consensus forum registration form

Date:.....

Name:.....

Profession.....

Institutions.....

Telephone number.....

Email.....

Signature

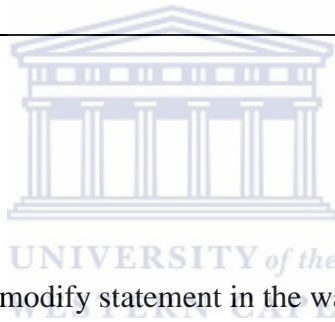


Appendix 6: Consensus agreement form

Individual consensus form

Key: 1= agree to the statement; 2= modify statement in the way I did it; 3=abstain (will go with other's decisions); 4= delete/remove statement

Statement	1	2	3	4
Organizational support structure				
Statement 1.1				
Statement 1.2				
Statement 1.3				
Statement 1.4				
Statement 1.5				
Statement 1.6				
Statement 1.7				



Individual consensus form

Key: 1= agree to the statement; 2= modify statement in the way I did it; 3=abstain (will go with other's decisions); 4= delete/remove statement

Statement	1	2	3	4
Information infrastructure and networking for DMHIS				
Statement 2.1				
Statement 2.2				
Statement 2.3				
Statement 2.4				
Statement 2.5				

Individual consensus form

Key: 1= agree to the statement; 2= modify statement in the way I did it; 3=abstain (will go with other's decisions); 4= delete/remove statement

Statement	1	2	3	4
Capacity building program in health information system				
Statement 3. 1				
Statement 3. 2				
Statement 3.3				
Statement 3.4				
Statement 3.5				
Statement 3. 6				
Statement 3.7				

Individual consensus form

Key: 1= agree to the statement; 2= modify statement in the way I did it; 3=abstain (will go with other's decisions); 4= delete/remove statement

Statement	1	2	3	4
Community and stakeholders participation in the design and development of information collection tools and information content				
Statement 4.1				
Statement 4.2				
Statement 4.3				
Statement 4.4				
Statement 4.5				
Statement 4.6				

Individual consensus form

Key: 1= agree to the statement; 2= modify statement in the way I did it; 3=abstain (will go with other's decisions); 4= delete/remove statement

Statement	1	2	3	4
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Develop a culture of quality data generation, process ,outputs and utilization				
Statement 5.1				
Statement 5.2				
Statement 5.3				
Statement 5.4				
Statement 5.5				
Statement 5.6				
Statement 5.7				
Statement 5.8				
Statement 5.9				
Statement 5.10				
Statement 5.11				
Statement 5.12				





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