

https://dspace.org/

Factors Influencing the Adoption of a National Integrated Human Resource Information System in the South African Health Sector

Rwigamba, Megan

2025
University of the Witwatersrand, Johannesburg
https://hdl.handle.net/10539/49725
Rwigamba, Megan. (2025). Factors Influencing the Adoption of a National Integrated Human Resource Information System in the South African Health Sector [Master's dissertation, University of the Witwatersrand, Johannesburg]. WIReDSpace. https://hdl.handle.net/10539/49725

Downloaded from a DSpace repository. https://dspace.org/

FACTORS INFLUENCING THE ADOPTION OF A NATIONAL INTEGRATED HUMAN RESOURCE INFORMATION SYSTEM IN THE SOUTH AFRICAN HEALTH SECTOR

Megan Rwigamba
Student Number: 1494901

Supervisor: Dr Prudence Ditlopo
Co-Supervisor: Dr Verona Mathews

A research report submitted in partial fulfilment of the requirements for the degree of Master of Public Health (MPH) in the School of Public Health
Faculty of Health Sciences
University of the Witwatersrand, Johannesburg

October 2025

DECLARATION

I, **Megan Rwigamba**, declare that this research report is my original work. It is being submitted for the degree of Master of Public Health in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University. I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong. I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.

I have read the sections on referencing and plagiarism in the Wits Plagiarism Policy and I have followed the required conventions in referencing the thoughts and ideas of others. I understand that the University of the Witwatersrand may take disciplinary action including suspension or permanent expulsion against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature: 

Date: 13 October 2025

DEDICATION

In loving memory of my dear late father Alpha Rwigamba, I dedicate this body of work to him. Dad, your presence is deeply missed, but your love and guidance continue to inspire me every day. You are cherished always and forever remembered.

I also extend my heartfelt dedication to my family members, who have been unwavering support pillars throughout this endeavour. To my beloved mother, Ruth, and my siblings, Viola, Walter, Warren, and Melissa, thank you for your constant presence and encouragement. Your love and support have been a source of strength and inspiration.

To my dear niece, Aviana, I dedicate this work to you, hoping that you always remember your limitless potential. May you embrace every opportunity with confidence and determination, knowing that you can achieve anything you set your mind to.

Finally, to my cherished husband, Roland, words cannot express my gratitude for your unwavering support and understanding. Your love and encouragement have been my guiding light, and I am immensely grateful for your presence in my life.

ACKNOWLEDGEMENTS

I am profoundly grateful to my supervisors, Dr Prudence Ditlopo and Dr Verona Mathews. Your unwavering support, invaluable guidance, and constant encouragement helped me cross the finish line. Your dedication to my academic growth, through continuous feedback, corrections, and constructive criticism has pushed me to improve my research skills and strive for excellence. I recognize the profound personal and academic growth I have experienced, which I attribute to your mentorship and commitment.

I also extend my heartfelt appreciation to the study participants who graciously agreed to take part in this research. Their willingness to share their insights and experiences has been invaluable in shaping the outcomes of this study.

Above all, I give praise and honour to God almighty for guiding and sustaining me throughout my postgraduate journey.

ACRONYMS/ ABBREVIATIONS

BHF	Board of Health Care Funders
CDC	Centre for Disease Control and Prevention
CMSA	The Colleges of Medicine of South Africa
DHIS	District Health Information System
DOI	Diffusion of Innovations Theory
EE	Effort Expectancy
GHWA	Global Health Workforce Alliance
HIS	Health Information Systems
HISP-SA	Health Information System Program South Africa
HOT-fit	Human-Organisation-Technology fit
HPCSA	Health Professions Council of South Africa
HR	Human Resources
HRH	Human Resources for Health
HRIS	Human Resource Information System
HREC	Human Research Ethics Committee
HS	Health System
HW	Health Workforce/ Health Workers
IS	Information Systems
ICSP	Internship and Community Service Program
LMICs	Low- and Middle-Income Countries
MPH	Master of Public Health
MDS	Minimum Data Set
NHI	National Health Insurance
NHWA	National Health Workforce Accounts
NDoH	National Department of Health
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PEPFAR	United States President's Emergency Fund
PERSAL	Personal and Salary System
PU	Perceived Usefulness
SANC	South African Nursing Council
SAPC	South African Pharmacy Council
SI	Social Influence
TAM	Technology Acceptance Model
TOE	Technology-Organisation- Environment model
UTAUT	Unified Theory of Acceptance and use of Technology
USAID	United States Agency for International Development
WHO	World Health Organisation

TABLE OF CONTENTS

DECLARATION ..... **i**
DEDICATION ..... **ii**
ACKNOWLEDGEMENTS ..... **iii**
ACRONYMS/ ABBREVIATIONS ..... **iv**
TABLE OF CONTENTS ..... **v**
LIST OF TABLES AND FIGURES ..... **vii**
DEFINITION OF TERMS ..... **viii**
ABSTRACT ..... **ix**
CHAPTER 1: INTRODUCTION **1**
1.1 Background **1**
1.2 Overview of the South African HRIS **2**
1.2.1 Evolution Towards the Adoption of HRIS in the South African Health 5
1.3 Literature Review **8**
1.3.1 HRIS Definitions 9
1.3.2 Theoretical and Conceptual Frameworks of HRIS Adoption 10
1.3.3 Factors Influencing HRIS Adoption 12
1.4 Problem Statement **18**
1.5 Study Justification **19**
1.6 Study Aim and Objectives **20**
1.7 Research Questions **20**
1.8 Structure of the Research Report **20**
CHAPTER 2: METHODOLOGY **22**
2.1 Introduction **22**
2.2 Study Design **22**
2.3 Study Setting **22**
2.4 Study Population **23**
2.5 Study Sample **23**
2.6 Data Collection **24**
2.6.1 Document Review 24
2.6.2 In-depth Interviews with Key Informants 25
2.7 Data Management and Quality Assurance **26**
2.8 Data Analysis **27**
2.9 Rigor **27**
2.9.1 Dependability 28
2.9.2 Credibility 28
2.9.3 Transferability 28
2.9.4 Confirmability 29
2.10. Reflexivity **29**
2.11 Ethical Considerations **30**
2.12 Study Limitations **31**
2.13 Chapter summary **32**
CHAPTER 3: RESULTS **33**
3.1 Introduction **33**
3.2 Characteristics of the Study Participants **33**
3.3 Process and Progress of HRIS Adoption in the South African Health Sector **34**
3.4 Facilitators to HRIS Adoption **42**
3.4.1 Leadership and stewardship from the NDOH 42
3.4.2 Secure funding 44
3.4.3 Stakeholder engagement 44
3.4.4 System advocacy 49
3.5 Barriers to HRIS Adoption **50**
3.5.1 Inadequate institutional capacity 50

3.5.2 Change in organisational leadership 52
3.5.3 Top-down approach to policy adoption 53
3.5.4 Lack of a specified budget allocated to HRIS 55
3.5.5 Competing priorities 55
3.5.6 System complexity 56
3.6 Chapter Summary 56
CHAPTER 4: DISCUSSION 57
4.1 Introduction 57
4.2 Summary of the Study Findings 57
4.3 Progress of HRIS Adoption in the South African Health Sector 58
4.4 Facilitators of HRIS Adoption 59
4.4.1 Leadership and stewardship from the NDoH 59
4.4.2 Secure funding 60
4.4.3 Stakeholder engagements 61
4.4.4 System advocacy 62
4.5 Barriers to HRIS Adoption 64
4.5.1 Inadequate institutional capacity 64
4.5.2 Change in institutional leadership 64
4.5.3 Centralised decision making 66
4.5.4 Competing priorities 67
4.6 Chapter Summary 67
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS 68
5.1 Introduction 68
5.2 Study Recommendations 68
5.2.1 Leadership and stakeholder engagement 69
5.2.2 Invest in capacity building 69
5.2.3 Find a secure source of funds 69
5.2.4 Integrate HRIS into national health policy 70
5.2.5 Develop standardised data practices 70
5.2.6 Integrate the private sector information systems into the HRIS 70
5.3 Areas for Future Research 71
REFERENCES 72
APPENDICES 83
Appendix 1: Plagiarism Declaration form 83
Appendix 2: Turnitin Report 84
Appendix 3: Ethics clearance certificate 86
Appendix 4: Participant information sheet 87
Appendix 5: Participant consent forms 89
Appendix 6: Interview Guides 93
Interview Guide 1: For National Department of Health 93
Interview Guide 2: For Statutory Bodies 96
Interview Guide 3: For Health Information System (HISP) 99
Interview Guide 4: For Other Relevant Stakeholders 102

LIST OF TABLES AND FIGURES

Table 1.1: List of Study Participants

Table 2.1: List of documents Reviewed

Table 3.1: Characteristics of the study participants

Table 3.2: HRIS adoption progress

Table 3.3: Stakeholders level of involvement in HRIS adoption

Figure 1.1: From Plan to Action: South Africa's Journey to HRIS Adoption

Figure 3.1: HRIS work plan

Figure 3.2: HRIS architecture

Figure 3.3: HRIS stakeholder operating network

DEFINITION OF TERMS

The following definitions are provided to ensure uniformity and understanding of terms used in this protocol.

Human Resources Information Systems: "a system of collection, storage, analysis and reporting of data to produce meaningful information about the health workforce, including demographics, capacity, training needs, deployment, and migration patterns" (1).

Human Resources for Health: "All people engaged in actions whose primary intent is to enhance health including clinical staff such as physicians, nurses, pharmacists, and dentists, as well as management and support staff who do not deliver services directly but are essential to the performance of health systems" (1).

Adoption: "Choices made by an individual or organization to accept or reject a particular innovation and the extent to which that innovation is integrated into the appropriate context" (3).

Interoperability: "Capacity of IT for bidirectional communication and exchange of information allowing multiple agencies to use the exchanged information and communicate or work together" (4).

ABSTRACT

Background

Human Resource Information Systems (HRIS) have garnered significant acclaim as indispensable tools in Human Resources for Health (HRH) management. HRIS enable access to timely and accurate workforce data, thereby enhancing evidence-based health workforce planning and decision-making. Following recommendations from global partners, South Africa has embraced the concept of adopting HRIS in the health sector. This study seeks to explore the factors that facilitate and hinder the adoption of HRIS in the South African health sector, while also examining the progress made in adopting the system thus far. In so doing, this study endeavours to provide a comprehensive understanding of the current state of HRIS adoption, and key factors shaping the adoption process.

Methodology

This qualitative exploratory study employed a purposively sampling strategy to select the study participants. Semi-structured interviews were conducted to gather insights into the factors influencing the adoption of the integrated HRIS in the South African health sector. The interviews were guided by a pre-set interview guide containing a set of open-ended questions. Using Atlas.ti, thematic analysis was employed to analyse the data, and this involved the systematic process of coding, categorizing and identifying patterns. The codes were organized into overarching themes and sub-themes, providing a structured framework to interpret and explain the study findings.

Results

A noted finding of this study was that the HRIS architecture with its components (HRH registry, data warehouse, and user portal) were all developed and complete at the time this study was conducted, however the system was not fully adopted into the entire health sector. Facilitators such as *effective leadership*, *secure source of funding* and *rigorous stakeholder engagement* were identified as essential for HRIS adoption. However, barriers included: *inadequate capacity*, *change in organisational leadership*, competing priorities and *centralised decision making*. These findings contribute to a deeper understanding of the factors at play in the HRIS adoption process in the South African health sector.

Implications

The findings of this study provide invaluable insights into the factors influencing HRIS adoption within the health sector. These results underscore the need to prioritise the facilitating factors while mitigating the barriers. Focusing on this approach can enhance the likelihood of successful HRIS adoption in the South African health sector.

Keywords: *Integrated human resources information system, adoption, facilitators, barriers, health sector, South Africa*

CHAPTER 1: INTRODUCTION

1.1 Background

Human Resources for Health (HRH), often interchangeably referred to as the health workforce, are the linchpin of any functional health system, serving as crucial agents of service delivery, public health promotion, and healthcare management (2). Given their pivotal role, it is paramount for any given country to manage and strategically plan for their health workforce effectively. Health workforce planning entails ensuring that the right personnel, with the right skills, are available at the right place and time, providing the right services to the right people (3). Health workforce planning is widely acknowledged as a complex task that requires access to accurate and timely data and information to support evidence-based policymaking (4). Unfortunately, access to reliable and accurate health workforce data and information has been cited as a major hindrance to effective workforce planning in many developing countries (4).

Reports from the World Health Organisation (WHO) and the Global Health Workforce Alliance (GHWA) indicate that most countries, particularly low- and middle-income countries (LMICS), lack a centralised HRH data source (5,6). Instead, these countries extract fragmented information from various data sources, including population censuses, health labour surveys, health facility databases, and health professional licensing databases (4). However, while these data sources provide useful information, they present several limitations, such as being prohibitively expensive to routinely update (4) Furthermore, these sources were not originally designed to support HRH planning and management, which compromises their effectiveness for this purpose (4).

In efforts to mitigate persistent challenges surrounding health workforce data in many LMICs, there has been a global surge in advocacy calling on countries to invest in, and utilise information systems for recording and maintaining their health workforce data (7). For instance, the Kampala Declaration for Global Action on HRH, which was adopted at the First Global Forum on HRH in 2008, called upon countries to develop standardized indicators to monitor HRH flows within the health system (5). Further, the statement adopted from the 2011 Second Global Forum on HRH expressed *"a need for strong national capacity in all countries to regularly collect, collate, analyse, and share data to inform policymaking, planning, and management"* (6 p.80). Within the

African region, the 2007 African Union (AU) High-Level Inter-ministerial Technical Consultation emphasized that health workforce monitoring should be an integral component of the health information system (8). Additionally, it advocated for the improvement of data quality on the health workforce at the national and regional levels and investment in research for enhanced data collection to monitor health work numbers, distribution, mobility, and mortality (8).

Consequently, Human Resource Information Systems (HRIS) have been proposed as a viable solution to address these challenges, offering a streamlined and structured approach to accessing accurate and reliable HRH data (9). HRIS can be broadly defined as a database system designed to facilitate human resource management (HRM) by gathering, analysing, and reporting human resources (HR) data to enhance evidence-based decision-making processes (10). Aligned with global and regional recommendations, the South African government has articulated its vision to implement a national integrated HRIS as indicated in various HRH strategy documents. For example, the second objective of the recent 2030 strategy iterates the need to *"institutionalise data-driven, and research-informed health workforce policy, planning, management, and investment"* (11.p 43). The following sections provide an overview of the South African human resource information system while examining the various HRH data sources, their limitations and discussing the evolution towards the adoption of HRIS.

1.2 Overview of the South African HRIS

Currently, the South African health sector relies on various fragmented data sources for all health workforce information (11). Accurate health workforce data are not consolidated in a single repository across the entire health sector, whether public or private (11). The section below presents an overview of the main HRH data sources, their utilisation, limitations, and potential contribution to the integrated HRIS.

a. Personnel and Salary Administration System (PERSAL)

PERSAL is the central system used for the administration of public service payroll and it is maintained by the National Treasury (12). It was developed to integrate HR administration with salary payment functions, however, the user focus is mainly on the salary function rather

than the HR function (12). As a result, HR data on PERSAL is neglected and is often incomplete and inaccurate (13). The main challenge with PERSAL with regard to HRH data collection is the absence of standardised data collection methods and its non-integration with other HRH data sources, resulting in compromised accuracy and quality of collected HRH data (13).

b. Statutory Councils Databases

Statutory Councils are legal bodies established by parliament to govern the practice of specific occupations (14). Within the health sector, these bodies include: the Health Professionals Council of South Africa (HPCSA), the South African Nursing Council (SANC), and the South African Pharmacy Council (SAPC) (14). While these Councils provide valuable HRH data, a notable challenge lies in the accuracy of the information collected (11). Particularity and discrepancies arise regarding the status of registered health professions, as individuals may remain registered despite not actively practicing in their respective professions (11). This discrepancy possesses a major challenge in accurately accessing the health workforce status.

c. District Health Information System (DHIS)

The District Health Information System is a national system that collects routine health service utilization data monthly from all public healthcare facilities (15). It was developed to support decentralized decision-making and health service management (15). However, it later evolved into an open-source, web-based platform known as DHIS2 (13). It provides health profile information of public healthcare facilities depicting health service coverage and the burden of disease (13). The DHIS also integrates health management information with health workforce information using geographical information systems (GIS) (13).

d. Internship and Community Service Program (ICSP)

This is an electronic system for the placement of health professional interns and community service professionals (16). It was developed by the National Department of Health to promote efficiency and fairness in the allocation of the health workforce, especially in rural and underserved areas (13). It provides accurate information on the applications and vacancy placements of interns and community service health professionals (13).

e. Board of Health Care Funders (BHF)

The BHF is the representative body for medical schemes and healthcare funders in South Africa (17). It serves as a major data source for the private sector due to the volume of information it contains (18). Intriguingly, the BHF database differentiates between group and individual practices, allowing for a more nuanced understanding of the number of health professionals in the private sector (17).

f. The Colleges of Medicine of South Africa (CMSA)

With the primary purpose of serving as the national examining body for all medical professions in South Africa, the CMSA is comprised of 29 constituent Colleges that collectively represent all medical and dental disciplines within a single framework (19). As a result, it has the potential to provide essential data and information about medical and dental specialists in the country (19).

The HRH data obtained from the aforementioned sources provides invaluable insights, yet their inherent limitations pose significant challenges to effective health workforce planning (11), These limitations, presented below underscore the necessity for an integrated human resource information system (HRIS).

- Incomplete data**:** As presented above, the current HRH data and information sources in the South African health system are largely fragmented, with no clear communication and linkages between each of them, resulting in the derivation of incomplete and inaccurate data to support evidence-based HRH planning (11).

- Limited scope**:** These data sources typically have a limited scope of operation that does not include HRH planning (4). For example, PERSAL, the major system used for the administration of the public service payroll, is seldom used for HR administration, despite being an essential data source for HRH information, particularly in the public sector (11).

- Outdated information**:** Some of the databases may include obsolete information. For instance, data collected from the information systems of statutory authorities does not reveal whether the registered professionals are still active in the workforce or where they

are geographically stationed (11). This makes it difficult to determine the precise numbers of the active labour force and to plan properly (11).

- Lack of interoperability**:** Interoperability refers to *"the ability of different information systems to connect and exchange information with each other without limitations"* (20.p.2). Currently, with the exception of the DHIS and ICSP databases, which were developed by the Health Information Systems Program (HISP) - a global network of people, entities, and organisations that design, implement, and sustain health information systems (21), most of the existing information systems lack communication links between them (11). Lack of interoperability between the existing health information systems leads to disorganised and disjointed HRH information (11,20). Private sector information systems are entirely distinct and independent from public sector systems (11). HRIS promises to integrate all information systems for precise workforce planning across the nation (11).

1.2.1 Evolution Towards the Adoption of HRIS in the South African Health System

Figure 1.1 below provides a detailed infographic roadmap of the HRIS journey in the South African health sector, depicting the journey from the conception of the HRIS concept to the present-day progress.

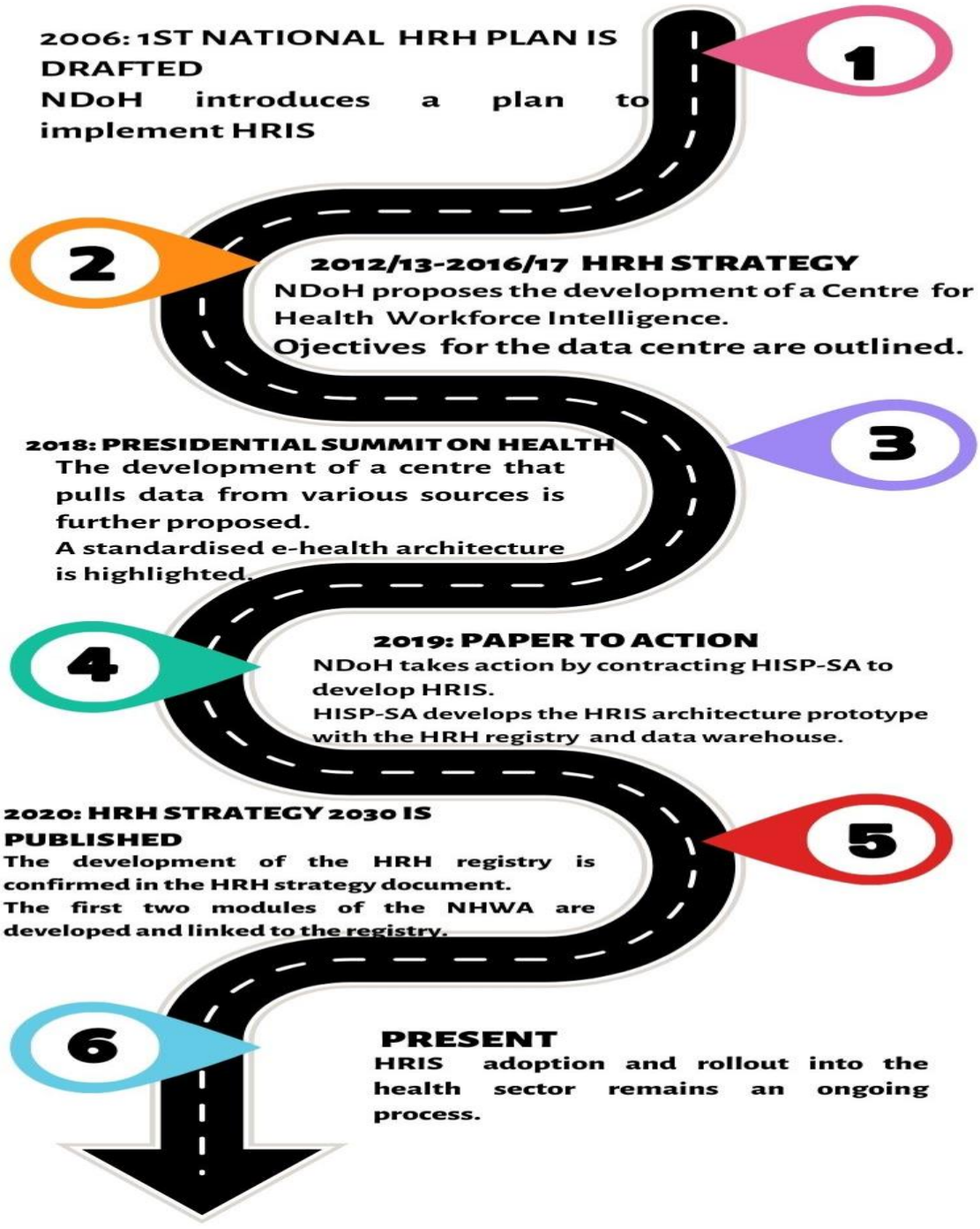


Figure 1.2: From Plan to Action: South Africa's Journey to HRIS Adoption

The concept of HRIS in the South African health sector was first introduced in the 2006 HRH policy strategy document, where the National Department of Health outlined its plans to implement a national HRIS to support HRH planning and management (22). Subsequent HRH strategy documents have further outlined strategic priorities for the NDoH including the establishment of a Centre for Health Workforce Intelligence which would provide essential HRH information for planning and management (11,23). According to the NDoH, this would be achieved through the development of an electronic database encompassing both public and private sectors (11). Key steps in this process would include the establishment of rigorous data collection methods, the development of the necessary system architecture and software solutions, and the standardisation of data reporting requirements from various sources such as the statutory bodies and the PERSAL systems (11).

In addition to previous initiatives, Figure 1 also demonstrates that the South African 2018 Presidential Health Summit proposed the development of a centre that pulls data from various systems and levels of care, along with a health observatory that includes registries (24). This centre would use a standardised e-health architecture to promote productivity and effectiveness in HRH planning and management (25). In 2019, the National Department of Health took a significant shift from planning to action by contracting HISP-SA to develop the envisioned HRIS. This shift led to the development of the HRIS architecture prototype, making a pivotal step towards HRIS adoption (11).

Concurrently, the South African government committed to adopting the World Health Organisation's National Health Workforce Accounts (NHWA) model (11). The NWHA is a system based on the health labour market framework, designed to standardise health workforce information systems by progressively monitoring set indicators, aimed at supporting the attainment of universal health coverage (26). The NHWA contains 78 key indicators, grouped into 10 modules (26). These modules include; active health workforce stock, education and training, regulation and accreditation, education finances, health labour market flows, employment characteristics, and working conditions, health workforce spending and remuneration, skill-mix composition for models of care, governance, and health workforce policies, and health workforce information systems (26).

The health workforce information systems module particularly defines indicators for accessing HRIS capacities at the national level (26). Currently, the first two modules of the NHWA are under development and will be linked to the HRH registry (11). The National Department of Health intends to develop and implement the rest of the NHWA module, in accordance with the requirements of the WHO (11).

Notwithstanding the strides made in advancing the Human Resource Information System (HRIS) from a conceptual plan to concrete actions, such as the development of the HRH registry, the adoption of a comprehensive national integrated HRIS has yet to be fully achieved across the entire health sector (11). There remains a paucity of studies that examine the factors that either facilitate or hinder the adoption of an integrated HRIS in low- and middle-income countries (LMIC), including South Africa. This Master of Public Health (MPH) research aims to explore stakeholders' perceptions on the factors influencing the adoption of the proposed national integrated HRIS in the South African health sector.

1.3 Literature Review

The literature review section of this research report aims to explore and synthesise the existing body of knowledge surrounding HRIS adoption. By exploring a wide range of scholarly articles and other relevant articles, this review provides a comprehensive overview of the HRIS and its place within health systems. The literature review serves as the foundation for this research as it identifies key concepts, theories, methodologies, and gaps in the existing literature. We aim to build upon the existing body of knowledge and contribute to the advancement of our understanding of the factors that influence the adoption of HRIS in the South African health sector. This section offers insights into the following:

- Various definitions of HRIS
- Theoretical and conceptual frameworks of HRIS adoption
- Factors that influence the adoption of HRIS

1.3.1 HRIS Definitions

Human resource information systems (HRIS) have been the subject of numerous studies since the rapid emergence of the technological era**.** Several authors have come up with various definitions to describe HRIS. For instance, DeSanctis et al (27), one of the earliest authors in the field of HRIS, laid the groundwork by describing HRIS as a complex reporting system that is designed to support the planning, administration, decision-making, and control of HRM activities (27). Later in the 1990s, Tannenbaum et al (28) expanded the understanding of HRIS by offering a more nuanced description of how these systems operate. He described HRIS as *"a system used to acquire, store, manipulate, analyse, retrieve, and distribute pertinent information regarding an organisation's human resources"* (28.p.27). The latter author underscored that HRIS is much broader than mere computer hardware and human resource-related software, it also includes individuals, forms, policies and procedures, and data (28).

Building on earlier definitions, Hendrickson et al (29) provided a holistic view of HRIS by offering a description of HRIS that recognises both the technical and organisational aspects of HRIS. He described HRIS as systems that consist of processes, procedures, persons ,and functions involved in the acquisition, conservation, recovery, handling and distribution of an organisations human resources information (29).

More recently, Ruel et al (30), defined HRIS not as a singular technology, but rather a combination of all Information Technology (IT) based systems and applications, whether stand-alone or interconnected, that work together to facilitate human resource management (30). Menant et al (31) concurred with the latter definition, stating that HRIS enables Human Resource Department activities to be computerised via interconnected systems (31). In the context of the health system, the World Health Organisation (WHO) defines HRIS as a *"basic tool that can provide information on the health workforce situation and its evolution"* (32.p.267). What all of these definitions have in common, either explicitly or implicitly, is the concept of an information system designed to strengthen access to human resource information or data, thereby guiding human resource management and decision-making.

1.3.2 Theoretical and Conceptual Frameworks of HRIS Adoption

Numerous studies have examined Human Resource Information Systems (HRIS), leading to the development of several frameworks aimed at understanding the factors that influence their adoption. The Technology Acceptance Model (TAM), developed in the eighties by Fred Davis et al (33) is perhaps the oldest and most widely used model for understanding technology adoption. It postulates that two primary factors influence technology adoption, these include Perceived Usefulness (PU), and Perceived Ease of Use (PEOU) (33). In this context, perceived usefulness refers to the degree to which an individual believes that a particular technology will enhance their job performance, while perceived ease of use is the extent to which a person believes that using the technology will be free of physical and mental effort (33). In essence, if users perceive the technology to be beneficial and effort-free, they are more likely to adopt it (33). According to some scholars, the TAM model has enjoyed widespread popularity in information systems research because of its simplicity and broad applicability (34). However, some critics have argued that TAM is oversimplified in a way that ignores other variables such as cost, and structural or organisational imperatives that push users to adopt the technology (35).

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed later in 2003 by Venkatesh et al (36), integrates elements from other prominent models including the TAM model to provide a more comprehensive understanding of user acceptance of technology and usage behaviour. UTAUT considers four key constructs which include; Performance Expectancy (PE), similar to perceived usefulness, which refers to the belief that system usage will help users achieve optimum efficiency in their activities (36). Effort Expectancy (EE), akin to perceived ease of use, refers to the user-friendliness associated with the system (36). Social Influence (SI) is the degree to which external factors such as social norms impact one's decision to adopt technology (36). Finally, Facilitating Conditions relate to the availability of resources, support, and infrastructure needed for technology adoption (36). UTAUT is viewed as a modified extension of the TAM model which incorporates additional factors, such as social norms and facilitating conditions which are ignored by the TAM framework (37).

The Diffusion of Innovations Theory (DOI) highlights five key attributes namely: relative advantage, compatibility, complexity, trialability, and observability that affect the adoption rate of

technology systems (38). Another notable conceptual framework is the Technology-Organisation-Environment (TOE) framework developed by Tornatzky and Fleischer which considers how Technological, Organisational, and Environmental factors influence the adoption of technology (39). The Technology component focuses on the characteristics of the technology, assessing how factors such as complexity, compatibility, and relative advantage may influence its adoption (40). In contrast, the Organisational component of this framework examines the internal factors that influence technology adoption within an organisation (40). Key aspects in this component include; organisational size, managerial structure, degree of centralisation, and availability of resources (40).

The environmental component includes all the external factors exerted on the organisation or department from its surroundings. These include competitive pressure, government regulations, and support as well as technology vendor support (39). Literature indicates that competitive external pressure as well as the availability of skilled technology vendors and consultants can foster technology adoption (40). Government regulations can either facilitate or hinder technology adoption; for instance, stringent technological safety and licensing requirements from the government can retard innovation adoption (40).

With specific attention to health information systems (HIS), Yusof et al (41) presented the Human-Organisation-Technology-fit (HOT-fit) model which integrates three main factors; Human, Organisational, and Technology as its name implies (41). Additionally, the model introduces the concept of "fit", focussing on how these factors interact and align with each other to influence HIS adoption (41). The technology and organisation components of the model are akin to those presented in the TOE framework (40). However, the HOT-fit profoundly emphasises human factors such as user perceptions, emotions, knowledge, and expectations as well as user satisfaction (41). Some researchers have concurred with the view that the human dimension should be considered when examining technology adoption. For instance, Alam et al (42) argued that users' lack of technical knowledge and skills can heighten their perception of system complexity, ultimately leading to increased resistance or delays in adopting the new technology (42).

The models discussed above undoubtedly provide a multifaceted approach to understanding the factors that influence the adoption of technology, each highlighting different aspects involved in the adoption process. For instance, TAM and UTAUT emphasise the interaction between the

characteristics of the technology itself and the user, while the TOE and HOT-fit models highlight the mechanisms by which the organisational, environmental, and human factors influence technology adoption. Despite their popularity in technology adoption research, these frameworks have been predominantly applied in quantitative studies such as; Sumantri et al (43), Princely et al (44), and Alkhwaldi et al (45). More recently, Deharja et al (46), used the HOT-fit model to evaluate the usability of hospital information systems in Indonesia. Interestingly these models' applicability in qualitative studies has been limited. This study does not intend to rely on any single model for analysis but will instead draw insights from these frameworks to understand the factors influencing the adoption of a national integrated HRIS in the South African health sector.

1.3.3 Factors Influencing HRIS Adoption

Human Resource Information Systems have been associated with improving organisational efficiency and decision-making, by providing an integrated platform that enhances HR functions and strategic decision-making (42). Despite their clear advantages, the path to successful adoption of HRIS is complex and multifaceted. Many researchers have attempted to explore the myriad of factors influencing HRIS adoption, both in micro-level contexts such as Small and Medium Enterprises (EMSs) as noted by Imron et al (47), and macro-level contexts such as national health systems, as highlighted by Dilu et al (10). This section draws on existing literature and the experiences of the countries that have attempted to adopt HRIS in their health sectors, to offer a detailed understanding of the facilitators and barriers to HRIS adoption within the health sector.

Facilitators for HRIS Adoption

1. Top management support

Top management support has been highlighted as one of the key organisational drivers of HRIS adoption (42,48,49). While there is no well-formulated definition of top management support, in the context of HRIS, it refers to the efforts and policies implemented by an organisation's top leadership to promote and facilitate the system's adoption and usage (43). Information systems researchers argue that the direct involvement and participation of the executive branch of an organisation cannot be overlooked for the successful adoption of any technology or innovation. Top management support plays a pivotal role in demonstrating a commitment to HRIS adoption

by allocating the necessary resources for HRIS adoption (50). Furthermore, top managers can encourage system adoption by actively using the HRIS themselves and leveraging their powers to influence employees to embrace the new innovation (51).

An empirical study on the determinants of HRIS adoption in Bangladesh revealed that top management support was crucial for innovation adoption (52). In this context, top management provided unequivocal approval for HRIS adoption, viewing it as a strategically important initiative for the organisation. Their involvement was direct and deliberate which underscored their commitment to successfully adopting HRIS. This finding is consistent with a similar study in Kenya which revealed that top management support played a critical role in the adoption of HRIS in the Teachers Service Commission (TSC) (53). In this case, senior management demonstrated their support for HRIS through their widespread buy-in and organisational endorsement of the HRIS (53). Moreover, in Pakistan, a study found that top management support was characterised by the creation of an enabling organisational climate that encouraged innovation, along with providing adequate funding and resources to facilitate HRIS adoption (54). Within the health sector, comparable patterns of strong leadership commitment have also been observed. For instance, in Mozambique, the successful implementation of the Electronic Personnel Information System for Health (eSIP- Saúde) was largely attributed to the Ministry of Health's top leadership, who demonstrated a conscious awareness of the importance of HRIS and championed its adoption (54). Similarly, in Tanzania, during the rollout of the national health information systems, the Ministry of Health offered supportive supervision to all the HRIS implementing sites, ensuring users received adequate assistance and addressing any system weaknesses (55).

In contrast, a more recent case study in Algeria highlighted that despite top managers' understanding of HRIS and its potential benefits, communication challenges between employees and managers ultimately delayed HRIS adoption (57). Top management support in its broader perspective has a directly proportional relationship with technology adoption as elucidated in the existing literature (51). The overarching view is that the greater the support from top management, the easier it is for organisations to overcome challenges encountered during adoption, thus increasing the likelihood of successful adoption (50). Conversely, less support from top managers reduces the chances of addressing these challenges (50).

2. Secure source of funds

A reliable source of funding is arguably one of the most essential facilitators of HRIS adoption, given the exorbitant costs associated with implementing such systems (4). These costs usually include substantial investments in infrastructure, human resources, and ongoing maintenance expenses (58). According to the World Health Organisation (2022), the absorption of these costs must be strategically planned to support the system's expansion, training, and management requirements (32). Depending on the context, it may be necessary to acquire new computers and software for each of the HRIS functions, in addition to ensuring internet connectivity, which is an essential requirement for HRIS functionality (10). The huge financial burden of HRIS adoption is inevitable, especially for countries or organisations transitioning from paper-filling systems to electronic systems (10,59).

Funding for the adoption of HRIS in the health sector is historically been complicated, especially for developing countries (4). However, global health partners such as the Centre for Disease Control (CDC) and initiatives like the United States President's Emergency Fund (PEPFAR), have shown commendable goodwill and a keen interest in supporting HRIS efforts (60). These global funders have invested in over 17 national HRIS in Africa as highlighted in many country cases (4,61,62). For example, Mozambique's eSIP-Saude was developed in collaboration with the CDC as the funding partner (55). Summarily, the Uganda Nurses and Midwives Council (UNMC) partnered with the Capacity Project, a United States Agency for International Development (USAID) initiative to develop an electronic HRH database (63). However, it is important to note that the funder partners usually limit their financial contribution to the development and implementation phases of HRIS with the expectation that the respective governments will commit to long-term sustainability and maintenance of the system (64). This approach places the responsibility on governments to secure funds needed for scaling the system after external funding has ended (64) in hopes that the respective governments would then be responsible for continuing with the system's sustenance and maintenance.

3. Rigorous stakeholder engagement

HRIS adoption is a multi-sectorial undertaking involving various stakeholders with distinct mandates and responsibilities related to HRIS (65). These stakeholders may include system developers, implementers, system users, and external partners such as donor organisations (6). Empirical evidence from diverse country contexts where HRIS has been adopted substantiates the positive relationship between stakeholder engagement and sensitisation efforts, and the successful adoption of HRIS (66). Several strategies can be employed to mobilise stakeholders and increase buy-in. These may include: involving the relevant stakeholders early on the development stage, providing training and support, as well as creating a feedback mechanism for them to share their concerns and suggest improvements (65).

The South-South collaboration between Kenya and Zambia serves as a strong example of how effective stakeholder engagement can positively impact HRIS adoption (62). By involving a diverse group of stakeholders including government agencies from both countries, representatives from health training institutions, health professional regulatory bodies, and development partners, the collaboration demonstrated the value of cross-national cooperation in strengthening HRIS initiatives (62). Moreover, a report published by the Capacity Project on the impact of HRIS strengthening in nine developing countries highlighted the importance of establishing HRIS stakeholder leadership groups as a strategic approach to coordinate and harmonise HRIS-related activities (67). Stakeholder engagement is an important factor in ensuring buy-in and commitment from all the relevant partners which is essential for successful HRIS adoption (67).

4. Training and skills development

Literature on innovation adoption indicates that individuals with relevant technical skills are less resistant to adopting new technologies (50,51,68). HRIS is a technically complex system with various features such as payroll, recruitment, and HR planning, necessitating that users be equipped with the relevant skills and competencies to operate it efficiently (69). Training is critical in this regard and can be provided through hands-on sessions, and workshops and continuous learning opportunities, which enhance user acceptance and confidence in navigating the system (7).

Moreover, training bridges the gap between system developers and end-users (7). By involving the users in training from the initial stages of HRIS implementation, organisations can garner feedback to make the system user-friendly (65). This collaborative approach not only improves the system's functionality but also fosters a sense of ownership of the system among users, further promoting successful adoption (65). Additionally, ongoing training and support are crucial to ensure that users stay updated on system upgrades and new features, thereby maintaining the efficacy and efficiency of the HRIS (70).

Evidence from Tanzania suggests that specialised training workshops focussed on system operation and data utilisation were instrumental in the successful rollout of HRIS (56). These workshops provided users with the necessary skills to utilise the system (56). Additionally, follow-up supervision after the training ensured the proper adherence to system operation guidelines and addressed any user concerns that arose (56). System training is therefore underscored as a key facilitator for HRIS adoption. Without the relevant skills, users are more likely to have negative perceptions of the system, leading to reluctance in its adoption (42).

Barriers to HRIS Adoption

1. Technological challenges

In this context, technological challenges refer to issues directly associated with the functionality and operation of the HRIS technology itself (42). These include system compatibility and interoperability with existing systems, system complexity and user-friendliness, and the infrastructural requirements of the system (42). HRIS often needs to integrate with existing information systems, whether within the Ministry of Health or with other stakeholders' information systems (71). This integration requires maximum system interoperability to avoid issues of duplicate workflows and system fatigue (72). Research from developing countries indicates that information systems within the health sector tend to be highly fragmented with deficient interoperability mechanisms (4,71).

A recent assessment of HRIS systems in several developing countries revealed a significant gap in system interoperability (72). For example, Uganda was found to have a multiplicity of

information systems within the Ministry of Health, however, these systems lacked interoperability, resulting in misaligned system capabilities (72). System complexity is another technological challenge associated with HRIS adoption (42). This challenge is usually shaped by users' perceptions of the system, whether they view it as user-friendly or complex (42). Literature indicates a direct relation between perceived complexity and the likelihood of adoption (33,34,73). When users perceive the system as complex, they are resistant to adoption, whereas if the system is seen as easy to use, they are more likely to embrace adoption (42).

2. Lack of capacity

"Capacity" in this context, refers to an organisation's ability to absorb innovation into its organisational culture and management processes (74). This requires substantial investments in the development of appropriate infrastructure and the training of personnel to be proficient in HRIS dynamics (74). Robust technological infrastructure, including computer hardware, specialised software, and reliable internet access is crucial for HRIS functionality (75). However, many LMICs face significant deficits in these areas as elucidated in recent studies (70). For instance, a study on the readiness of Ethiopia to implement HRIS revealed a myriad of capacity challenges including a lack of internet connection, inadequate computer storage and speed, lack of necessary office equipment, and frequent power shortages (10). Additionally, the lack of competent personnel skilled in information systems and human resources is cited as a capacity challenge to HRIS adoption (10). This shortage undermines an organisation's capacity to effectively implement HRIS, as highlighted in a rapid appraisal of Pakistan's ability to adopt HRIS where comparable issues were observed (76).

In addition to technical expertise, lack of funding is also a major capacity issue (73). Many developing countries rely on external donors to initiate HRIS activities (7). However, while these donor partners play a critical role in supporting the early phases of HRIS adoption, the long-term sustainability of the system is dependent on government financial commitment (65). Challenges arise when the respective governments cannot sustain the systems further as demonstrated in Uganda where a lack of continued financial contributions by the government limited the national HRIS's potential (77). Another pertinent issue about reliance on donor funding is that donors typically impose conditions such as hiring a development partner who is affiliated with them and a significant portion of the funds is allocated to that funder (62).

In addition to the facilitators and barriers of HRIS adoption discussed in sections earlier, other factors can act as either facilitators or barriers depending on the context of an organisation. One such factor is the degree of centralisation within an organisation (42). A highly centralised organisation typically yields all the decision-making power to the top levels of the organisational hierarchy (42). Centralisation can facilitate HRIS adoption by enabling top management to take deliberate actions that propel the process forward regardless of other opinions (78). When committed, top management can ensure adequate resource allocation and also prioritise HRIS initiatives as opposed to organisations that require multiple levels of approval (42). However, centralisation can also hinder HRIS adoption when specific user needs are not taken into consideration. Lack of flexibility and resistance to change from the system users can act as a major barrier to HRIS adoption (79).

In conclusion, the literature on HRIS adoption elucidates an intricate interplay of factors that can either facilitate or hinder its successful adoption. Countries or organisations intending to adopt HRIS need to take a balanced approach to these factors, and tailor them to their specific contexts.

1.4 Problem Statement

South Africa is among the countries that have committed to implementing a national integrated human resource information system in the health sector (11). Several high-level meetings have been held and many documents such as the HRH Strategies for the health sector have been drafted to guide HRIS implementation, however, progress has been slow. Instead, HRIS in the South African health sector tends to be highly fragmented, with the bulk of the health workforce information being obtained from stand-alone information systems as opposed to one integrated system (11). While basic HRH information can be obtained from these stand-alone information systems, they have major drawbacks such as inefficient data entry and translation processes and unspecified core data indicators. (13). Moreover, the inherent design limitations of these fragmented systems render them unable to effectively support HRH policy and planning endeavours (4). The absence of an integrated, comprehensive data system capable of aggregating information from both the public and private sectors presents a myriad of HRH data challenges. These challenges include data duplication, inaccurate data, and even poorly analysed data (11).

Without such a system, efforts to create a cohesive understanding of the health workforce landscape are hindered (11). Consequently, the lack of an integrated HRIS in the health sector results in misaligned workforce planning and resource allocation, which are essential for addressing HRH concerns (4,11).

Despite these challenges, notable progress has been observed within the South African Department of Health regarding the adoption of HRIS. For instance, the development of HRIS architectural components such as the data warehouse, the HRH registry, and the user portal represents significant milestones in this endeavour (11). While these advancements merit recognition, it is prudent to acknowledge that the full-scale rollout and adoption of the integrated HRIS across the entire health sector remain unrealised objectives. Consequently, there is a pressing need to delve into the intricate factors influencing the adoption of the proposed national integrated HRIS in the South African health sector, thus warranting this current study.

1.5 Study Justification

Given the complex nature of HRH planning and management, the importance of reliable and efficient data sources cannot be overlooked (48). As South Africa prepares to implement the National Health Insurance (NHI) policy (1), all efforts must be made to improve HRH planning, development, and management. HRIS presents unique opportunities for addressing challenges in HRH planning. By enhancing accessibility to accurate and reliable data, HRIS serves as a foundation tool for evidence-based HRH planning endeavours (4).

However, factors that influence the adoption of an integrated national HRIS, especially within the South African health sector context, have not been explored. Addressing this gap is imperative to enhance our understanding of the facilitators and barriers surrounding the adoption of an integrated HRIS in the South African health sector. By bridging this gap, this study aims to furnish policymakers and HRH managers with invaluable insights requisite for HRIS adoption.

1.6 Study Aim and Objectives

The overall aim of this study was to explore the factors influencing the adoption of a national integrated human resource information system in the South African health sector. The specific objectives were:

1. To explore stakeholders' perceptions on the progress made towards the adoption of a national integrated HRIS in the South African health sector.
2. To explore stakeholders' perceptions of the facilitators to the adoption of a national integrated HRIS in the South African health sector.
3. To explore stakeholders' perceptions on the barriers to the adoption of a national integrated HRIS in the South African health sector.

1.7 Research Questions

This study sought to answer the following questions which were formulated to explore the factors influencing HRIS adoption and the progress made thereof within the South African health sector. These questions were:

1. What are the stakeholders' perceptions on the progress made towards the adoption of a national integrated HRIS in the South African health sector?
2. What do stakeholders perceive as the key facilitators to the adoption of a national integrated HRIS in the South African health sector?
3. What do Stakeholders perceive as the main barriers to the adoption of a national integrated HRIS in the South African health sector?

1.8 Structure of the Research Report

This report is structured into five chapters, each addressing a specific aspect of the study as highlighted below:

1. **Chapter 1: Introduction and Literature Review** – Provides the study

background, an in-depth literature review of existing literature on HRIS adoption frameworks and factors influencing its adoption. Further, the problem statement, research aims and objectives, research questions, and study justifications are clearly explained in this chapter.

2. **Chapter 2: Methodology** – Describes the study design, as well as the methods and procedures employed for data collection and analysis, respectively.
3. **Chapter 3: Results** – This chapter presents the study findings organised according to the study objectives and emerging themes.
4. **Chapter 4: Discussion** -- Interprets the results in relation to existing literature.
5. **Chapter 5: Conclusion and Recommendations** – Summaries the main findings of the study and provides recommendations for policy practice, and future research.

The chapter overview presented above is aimed at providing a logical progression of this report.

CHAPTER 2: METHODOLOGY

2.1 Introduction

This chapter provides an intricate account of the methodology employed to generate the research findings. From the overarching study design to the intricacies of the study setting, study population, and the specific sampling techniques used, this section highlights a transparent and comprehensive overview of the data collection and management processes. Additionally, it explains the data analysis procedures that led to the study findings and describes the measures taken to ensure ethical integrity throughout the study.

2.2 Study Design

An exploratory qualitative study design was used because it allows for an in-depth understanding of the views, attitudes, and feelings of the study participants (81). This study design further allows for new concepts to emerge during the research process as HRIS adoption in the South African health sector is still an unfamiliar phenomenon.

2.3 Study Setting

The study was conducted across a diverse sphere to ensure maximum variation. The study setting included the National Department of Health (NDoH), Gauteng Department of Health (GDoH), the Health Information Systems Program (HISP-SA), the South African Nursing Council (SANC), and Academia.

For context into the study setting, the National Department of Health is the highest health policy-making body in South Africa whose mandate is to provide a framework for a structured and uniform health system (82). Similarly, the Gauteng Department of Health functions as the province's health governing body (83). HISP-SA operates as a section 21 non-profit, organization specialising in the development and maintenance of government health information systems (84). Additionally, the South African Nursing Council is a statutory body mandated with the registration and regulation of the nursing profession (85). The public health educators were based at public health schools in the Western Cape and Gauteng provinces respectively.

Although the study aimed to explore the factors influencing the adoption of an integrated national HRIS, the selection of these study sites and participants was informed by both contextual and practical considerations. At the time of the study, the HRIS was still being rolled out and had not yet been adopted across all the nine provinces. Gauteng was therefore selected for two reasons: firstly, it was one of the first provinces where HRIS implementation was actively underway. Secondly, given that the researcher resided in Gauteng, access to the participants within the province was more feasible. Expanding data collection to all nine provinces would have been constrained by access and resource limitations.

2.4 Study Population

The study population comprised of all relevant stakeholders knowledgeable about or involved in the adoption of HRIS in the South African health sector.

2.5 Study Sample

Purposive sampling was used to select appropriate study participants on the basis of being knowledgeable or involved in the adoption of HRIS in the health sector. A snowballing approach, which involved asking each participant to identify other stakeholders to interview, was also used. In total, nine participants were interviewed for the study (Table 2.1). The inclusion of public health educators was informed by their substantive involvement in HRIS-related initiatives, particularly their participation in the task team responsible for conceptualising the system.

Table 2.3: List of Study Participants

Category	Number
National Department of Health	2
Health Information Systems Program (HISP-SA)	1
Gauteng Department of Health	2
Researchers/ Academics (Public health educators)	2
South African Nursing Council (SANC)	2
Total	**9**

Professional regulatory bodies, including the Health Professions Council of South Africa (HPCSA) and the South African Pharmacy Council (SAPC) were not deliberately excluded from the study. Concerted efforts were made to engage representatives from these organisations; however, participation was limited due to their expressed reservations, primarily stemming from a lack of familiarity with the system.

1.6 Data Collection

2.6.1 Document Review

This study employed a document review as part of the data collection to examine relevant policy documents, strategy reports, consultation drafts, and workshop presentation slides on HRIS adoption in the South African health sector. The documents reviewed were from 2019- 2023. The document search process was limited due to the restricted availability of HRIS documents in the public domain. The documents reviewed included the abridged draft for consultation on information, monitoring and evaluation, research, and innovation, as well as the 2030 National Human Resources for Health Strategy and presentation slides from an HRIS lecture made by a senior manager from the National Department of Health. The National Human Resources for Health Strategy is publicly available and was retrieved from the National Department of Health website.

However, the abridged draft for consultation on information, monitoring and evaluation, research, and innovation is an unpublished document, provided to the researcher by a member of the ministerial task team involved in HRH research. Although this draft is not publicly accessible, it contains pertinent information on HRIS in the South African Health sector. Additionally, presentation slides from a workshop attended in person also were reviewed. A list of the documents reviewed is shown in the Table 2.2 below.

The selection of documents for review was informed by the study's objectives and research questions, with a focus on materials that could provide relevant insights into the progress and adoption of the HRIS within the South African health sector. Although HRH strategies and policies predating 2019 were accessed to provide contextual background, their content was insufficient for

addressing the specific aims of the study. As a result, the document review concentrated on the period from 2019 to 2023, during which substantive developments, implementation activities, and measurable progress in HRH were documented.

Table 4.2 List of documents reviewed

Document	Year	Relevance to study
Work Stream Abridged Chapters for National Stakeholder Consultation-Work Stream 5 Information, Monitoring and Evaluation, Research and Innovation	2019	This is an unpublished draft for consultation which contains relevant information on HRIS plan by the NDoH
2030 Human Resources for Health Strategy: Investing in the health workforce for Universal Health Coverage	2020	This document by the National department of health contains a section on HRIS development (Strategic goal 2)
HRIS workshop presentation slides	2023	These slides contain information on the current status of HRIS in the health sector

2.6.2 In-depth Interviews with Key Informants

Using semi-structured interview guides (Appendix 3A, 3B, and 3C), in-depth interviews were conducted with selected key informants. Three tailored interview guides were developed: one for the representatives of the Department of Health, one for the representatives of Statutory Bodies, and one for the representatives of HISP-SA. These interview guides served as a structured framework to steer the interview, while allowing for flexibility to explore other emerging themes during the interviews. The issues explored in these interview guides included the participant's perceptions on the progress made towards the adoption of a national integrated HRIS, as well as the facilitators and barriers to HRIS adoption in the South African health sector. The questions in the interview guide were informed by the existing literature and theoretical approaches on HRIS adoption. The review of theoretical frameworks identified several recurring themes that are central to understanding the adoption of HRIS: technological, organisational, environmental, and individual (human) factors. These thematic domains provided a conceptual foundation for the development of the interview guides, ensuring alignment with the overarching objectives of the study.

Data collection occurred from March to October 2022. After identifying the relevant participants, the researcher contacted them either telephonically or via email to invite them to participate in the study. They were then provided with the participant information sheet (Appendix 1) via email or in person which contained details of the study. The interviews were conducted in-person or virtually using zoom. This was dictated by several factors including participant's preferences as well as distant geographical locations. Regardless of the mode, in both instances, audio or video recordings were made. Although virtual interviews facilitated the observation of facial expressions, vocal tone, and pauses, they limited access to broader non-verbal cues and contextual elements typically available in face-to-face interactions. Nonetheless, careful attention was paid to participants' verbal responses, and follow-up questions were strategically employed to clarify meanings and elicit deeper insights, thereby ensuring the richness and depth of the data were maintained. Prior to data collection, informed consent was obtained from the participants to conduct the interviews (Appendix 2A) as well as to record them (Appendix 2B). The interviews lasted approximately 40-60 minutes. Field notes were taken during the interviews to capture non-verbal cues and impressions that came up during the interviews.

2.7 Data Management and Quality Assurance

Upon data collection, all audio and video recordings were downloaded and saved on a password-encrypted file on the researcher's personal computer. The recordings were then uploaded onto Otter.ai, an online transcription service that converts audio files into legible text files; with an accuracy rate of approximately 85%-95% (86). The researcher found similar success with the application. To ensure maximum quality and accuracy, an iterative manual transcription process was conducted. This involved meticulously reviewing all the transcripts generated by Otter.ai while comparing them to the original recordings. Personal identifiers were deleted from each transcript and unique identifiers such as "HRIS participant 1" were assigned.

No reference was made to name of the participants' organisations or roles to ensure anonymity and confidentiality. The transcripts were then stored in another password-encrypted file on the researcher's personal computer. In compliance with the ethical regulations, all audio recordings and transcripts will be destroyed two years after publication of the study or six years if not published.

2.8 Data Analysis

After the transcription process was completed, the resulting transcripts were loaded into to ATLAS.ti version 24 for thematic analysis. This analysis was guided by Braun's five steps of thematic analysis (87). Firstly, the researcher familiarised herself with the data by extensively reading through all the transcripts line by line to identify emerging codes and possible themes. Through this process, a codebook of approximately 145 codes with appropriate code definitions was developed to organise and interpret the data. This codebook was subsequently refined in consultation with the supervisors. Both inductive and deductive approaches were employed to generate appropriate codes and themes. For instance, inductive coding allowed for the generation of new insights emerging directly from the data, while deductive coding was guided by the factors influencing HRIS adoption identified in existing literature and the theoretical frameworks reviewed. Key constructs from these frameworks gave rise to the initial codes. This approach ensured that the analysis was both data driven and grounded in theory. The participants' responses were compared and contrasted, highlighting similarities and differences among them. The findings were then interpreted and linked to the research objectives and validated in consultation with the supervisors.

For the document review, the researcher firstly identified relevant documents related to the study. A total of three documents, including strategic policy reports and presentation slides. Thereafter, the documents underwent a thematic coding process whereby they were carefully examined to identify recurrent patterns among the documents. These patterns were compared for consistency while taking account of the contextual difference of each document. The document review provided baseline information, especially about the development of HRIS and its progression. Subsequently, the data from the interviews was used to validate the information gathered from the document review.

2.9 Rigor

Ensuring rigor in qualitative research is fundamental to establishing the validity and trustworthiness of the findings. In this study, the researcher addressed rigor through the lenses of dependability, credibility, transferability, and confirmability as posited by Lincoln and Guba (88).

2.9.1 Dependability

Dependability refers to the consistency of the research findings over time (89). To ensure dependability in this study, streamlined procedures, and processes were rigorously followed by myself and evaluated by my supervisors. These included the establishment of a well-structured research design at the onset. This design entailed refining the research question to "What are the factors influencing the adoption of HRIS in the South African health sector?" and setting focused study objectives. Furthermore, the plan involved identifying appropriate study participants and developing a detailed plan for data collection methods and analysis techniques. This pattern acted as a guide, providing a clear and streamlined framework that could be replicated by other researchers. Moreover, an audit trail was kept in the form of raw data, transcripts, field notes, and a reflexive journal to provide a traceable account of all the decisions and choices made during the study journey.

2.9.2 Credibility

Credibility pertains to how plausible the research findings are in relation to the information drawn from the participants' original data (90). Techniques for establishing credibility include prolonged engagement with the study participants, persistent observation of the study setting and context, member-checking, debriefing with supervisors, and triangulation (88). To ensure credibility, triangulation was employed whereby the researcher obtained data and information on HRIS adoption from multiple sources including participant interviews, document reviews of HRIS reports, and attending HRIS presentation classes. Additionally, regular debriefings were conducted with my supervisors whereby they were able to provide feedback and scrutiny which ultimately helped to identify and address any inconsistencies in the research methodology and findings.

2.9.3 Transferability

Transferability addresses the degree to which study findings can be applicable or generalisable to other contexts or settings (91). Earlier inquiries in qualitative studies often denied generalisability claiming that such studies usually entail specific individuals and contexts and that their sample sizes are considerably smaller for the results to be broadly applicable (91). However, other scholars argued that qualitative study findings can be transferable if other researchers or readers who were not involved in the study can associate the findings with their own experiences (90). Transferability

can be achieved through a thick description of the study context and findings (90). In this study, I intently documented the strategies I employed to select and recruit the study participants and the methodologies and context in which the data was collected and analysed.

2.9.4 Confirmability

Confirmability denotes the extent to which the study findings represent the experiences and ideas of the participants, rather than the biases and perspectives of the researcher (92). In this study, several strategies were used to enhance confirmability. These included reflexivity, whereby the researcher constantly reflected on her own biases, assumptions, and perspectives and how they could influence the research. Data auditing was also conducted wherein the raw data, transcripts, and final reports were reviewed independently by the supervisors. Lastly, in presenting the study findings, verbatim quotes were included to provide evidence that the interpretations made accurately reflected the participants 'perspectives.

2.10. Reflexivity

Reflexivity entails the researcher critically assessing his or her assumptions, beliefs, and biases, and considering how these factors can influence the research process and outcomes (93). As a student researcher studying the adoption of HRIS in the South African health sector, I am aware of the potential biases that may influence my work. The participants in this study included officials from the Department of Health, an institution that often faces negative criticism in the media and the public. These criticisms often highlight inefficiencies and weak implementation of policies and programs. My awareness of these public perceptions could have unconsciously shaped my expectations and interpretations of the data. Furthermore, I was conscious of the power dynamics between myself and the participants, most of whom were very senior to me. This power imbalance could have potentially influenced both the way the participants responded to my inquiries and how I may have perceived their responses.

To mitigate these biases, I have taken several steps. Firstly, I consciously and intentionally reflected on how these biases may influence the research process and my interpretation of the study findings. I also documented my reflections in a journal to maintain awareness and accountability.

In addition, I engaged with my supervisors consistently to express these potential biases and get objective views from them. Secondly, I have endeavoured to approach each interview and interaction with an open mind, primarily focussing on the participant's perspectives rather than my own. Further, I have made deliberate efforts to establish a rapport and build trust with the participants using strategic communication channels such as email and telephone exchanges. Lastly, I have incorporated triangulation methods to strengthen the plausibility and minimise the impact of my biases on the findings.

2.11 Ethical Considerations

Ethical approval for this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (HREC) (#M210744). Additionally, ethical clearance was similarly acquired from the National Department of Health through the National Health Research Committee. Subsequently, potential study participants were approached for their consent to participate in the interviews. During initial contact, the purpose of the study was thoroughly explained, and a participant information sheet outlining the study aims and objectives was provided. Participants signed consent forms, and verbal consent was obtained at the commencement of each interview. Participants were assured of the voluntary nature of their participation, and their right to withdraw at any stage without consequences.

Confidentiality was maintained by storing collected information and transcripts in a password-encrypted folder on the researcher's personal computer. This was only accessible to the researcher. The data will be retained on this encrypted folder for two years after publication, or six years if not published, after which the data will be destroyed in accordance with the HREC guidelines. Participant anonymity was preserved during interviews, as pseudonyms were utilized during transcription. Adherence to the Protection of Personal Information Act (POPI) was ensured and observed. Measures were implemented to mitigate discomfort during interactions, with participants informed of their right to terminate interviews if discomfort arose. There were no direct benefits or risks of participating in the study, a fact that was thoroughly communicated to the participants. However, the findings of the research have the potential to strengthen the adoption of HRIS in the South African health sector. The research was conducted in a manner that did not

pose any harm to the participants, or their respective organisations through appropriate phrasing of the questions and presentation of the findings.

2.12 Study Limitations

At the time of the study, the adoption of an integrated HRIS in the South African health sector was still at a nascent stage. This posed significant challenges as limited awareness of the system by the participants hindered both their recruitment and their willingness to participate in the study. To mitigate this, a targeted approach was employed, involving the identification of stakeholders involved in the HRIS adoption process. These stakeholders were then asked to nominate additional participants deemed capable of providing invaluable insights to the study. Despite approaching the recommended additional participants, five of them declined to participate in the study and three did not respond to the researcher's request. Their refusal was based primarily on their unfamiliarity with HRIS adoption within the health sector. To augment the data pool, the researcher conducted a document review of grey literature pertaining to the adoption of a national integrated HRIS in the South African health sector. The document review was constrained by the limited availability of publicly accessible materials pertaining to the adoption of the HRIS in South Africa. Most of the relevant documents were not available in the public domain, which may have restricted access to additional data and nuanced insights into the processes and contextual dynamics underpinning HRIS implementation.

Another challenge was that certain participants' organizations required additional clearance from their internal research committees, which delayed the data collection process. Furthermore, the researcher encountered personal adversities, including experiences of loss and grief, during the study, leading to further temporary delays in the research process.

Owing to limitations in time, resources, and practical feasibility, the scope of the study precluded comprehensive involvement of several sectors, levels, and organizations encompassed within the South African (SA) health system, despite the intended applicability of the Human Resource Information System (HRIS) across the entirety of the healthcare infrastructure. Consequently, it is imperative to acknowledge that the findings derived from this study may not be fully representative of the broader landscape of the health system. However, the research obtained interesting insights

on the participants' perspectives on the progress made towards the adoption of HRIS as well as the facilitators and barriers of HRIS adoption in the SA health sector.

2.13 Chapter summary

This chapter detailed the qualitative design employed to explore the factors influencing HRIS adoption and the extent of progress achieved. Data were collected through in-depth interviews, supplemented with a document review, and were analysed thematically to identify recurring themes and insights. Ethical implications of the study, as well as all the procedures undertaken to ensure rigor, are explained thoroughly. A key limitation was the limited number of participants, which perhaps restricted the diversity of views captured. Nonetheless, the chosen approach provided a rigorous basis for exploring the HRIS adoption dynamics within the South African Health Sector. The next chapter presents the study findings

CHAPTER 3: RESULTS

3.1 Introduction

This section endeavours to present the findings derived from my investigation into the factors that influence the adoption of HRIS in the South African health sector. The study was guided by three main objectives; (1) to explore the progress made towards the adoption of HRIS, (2) to explore the factors that facilitate HRIS adoption, and (3) to explore the barriers to HRIS adoption within the South African health sector.

Section 3.2 presents the characteristics of the participants, while section 3.3 describes the process of HRIS adoption in the South African health sector. Section 3.4 focuses on the progress made towards HRIS adoption, while sections 3.5 and 3.6 present the themes derived from the data, in accordance with the study objectives.

3.2 Characteristics of the Study Participants

In total, nine key informants participated in the study representing various organisations or institutions within the South African health system where they held diverse roles (Table 3.1). These roles included human resource management, information systems development and maintenance, research management, legal and administrative management, and advancement of knowledge through research and training. The participants were drawn from national and provincial departments of health, a non-profit company specialising in health information systems, a regulatory body, and academic institutions, ensuring a broad representation of expertise and perspectives.

Table 3.1: Characteristics of Participants

Participant	Gender	Institution	Roles	Length of service
1	Male	National Department of Health (NDoH)	Oversees health workforce planning	20 years
2	Female	National Department of Health (NDoH)	Responsible for Human Resource for Health planning and management	19 years
3	Male	Health Information Systems Program (HISP)	Responsible for information systems development and maintenance	5 years
4	Male	South African Nursing Council (SANC)	Responsible for legal management	5 years
5	Female	South African Nursing Council (SANC)	Oversees administrative management	15 years
6	Male	Gauteng Department of Health (GDoH)	Oversees human resource management	8 years
7	Female	Gauteng Department of Health (GDoH)	Oversees research management	5 years
8	Female	University of the Western Cape (UWC)	Responsible for advancing health systems knowledge through research and training	30 years
9	Male	University of Pretoria (UP)	Responsible for advancing health systems knowledge through research and training	30 years

3.3 Process and Progress of HRIS Adoption in the South African Health Sector

One of the main objectives of the study was to explore the progress made towards the adoption of the National Integrated HRIS in the South African health sector. To fully contextualise this progress, it was important to first understand the process of HRIS adoption. Data derived from presentation slides on HRIS, by a representative of the NDoH at the Wits School of Public health in May 2023, revealed a structured and phased four-year work plan for HRIS adoption. The structured workplan for HRIS adoption based on insights from the HRIS lecture presentation is illustrated in the Figure 3.1 below.

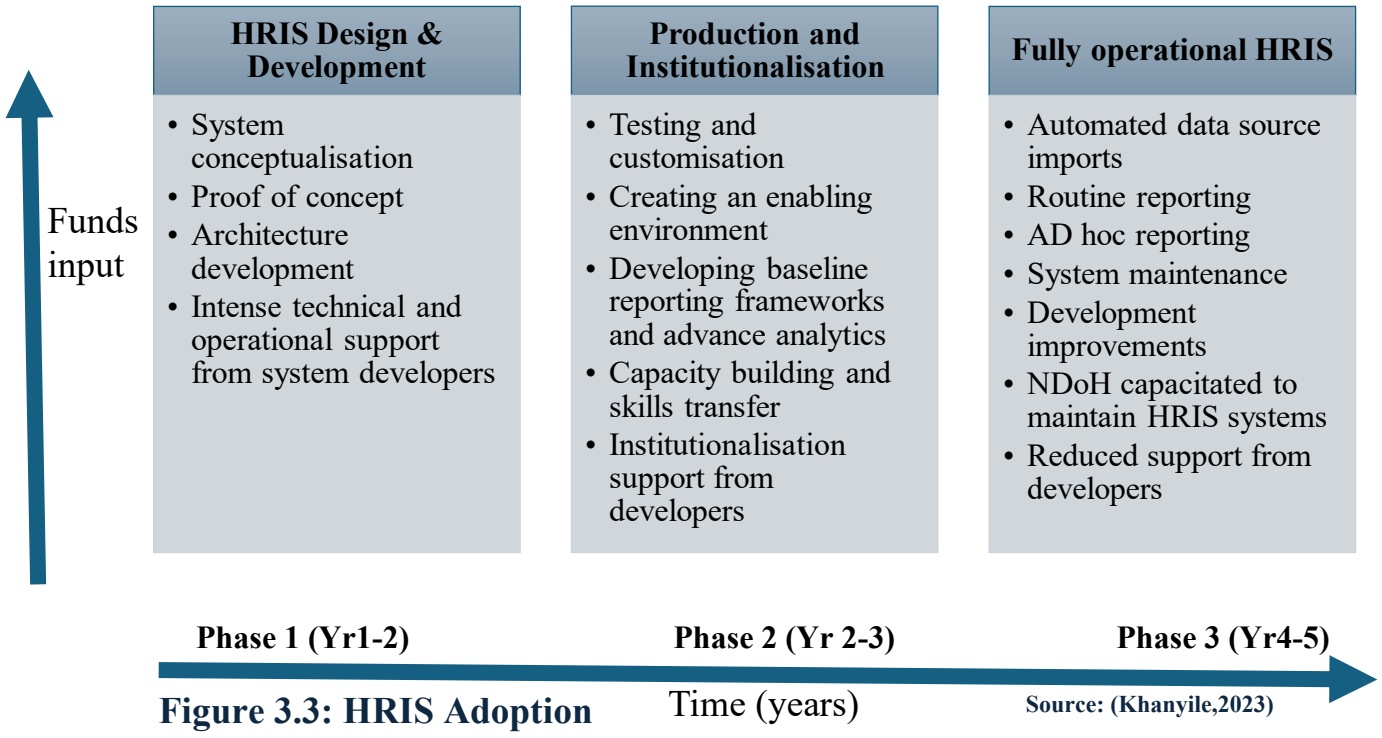


Figure 3.3: HRIS Adoption Source: (Khanyile,2023)

The section that follows discusses each of these phases in detail and highlights the progress made under each phase, drawing on evidence from document reviews and insights shared by study participants.

Phase 1: HRIS Design and Development

Description of the phase

According to insights from the HRIS lecture presentation, the initial phase of the HRIS adoption process focused mainly on three main activities, namely, system conceptualisation, production of a proof of concept and the development of the system prototype. This phase was characterised by the close collaboration between two primary stakeholders: The National Department of Health (NDoH), serving as the system custodians and the Health Information Systems Program South Africa (HISP-SA) as the system developers. Together, these stakeholders worked to conceptualise a system that would address the health sector's HRH data needs. A proof of concept was subsequently developed to support the feasibility of the project. Following this, the HRIS prototype

was developed which constituted three main system architectural components, including the HRH registry, the data warehouse and the user portal.

Progress achieved

According to the findings of this study, the objectives under this phase were achieved. Initially, findings from a document review of an abridged draft report for consultation on Information, Monitoring and Evaluation, Research, and Innovation, revealed that progress was made from conceptualisation to implementation of the HRIS. This progress was marked by the development of the HRH data warehouse as the first component of the HRIS architecture. The extract below from the abridged report reflects this:

> *"Work on the development of a comprehensive, integrated HRIS, starting with the development of an HRH Data Warehouse has commenced at a national level. In the HRH data warehouse, the data from various data sources will be aggregated and rearranged to enable users to analyse and run specific queries. This marks a first step towards implementing what was proposed in the preceding HRH Strategy."* Source: Work Stream Abridged Chapters for National Stakeholder Consultation-9 September 2019. Work Stream 5 Information, Monitoring and Evaluation, Research and Innovation.

Insights gathered from the interviews conducted later were consistent with the findings from the document review. These insights revealed that the development of the HRIS architecture had been completed as captured in the following quotations:

> *"We've been working on the conceptualisation and development of the HRIS for about three years now. We have achieved this through the development of three main components, which first of all is the human resource registry, which its purpose is to provide an authoritative source of all health care workers in South Africa as a central reference point for health service planning, providing, education and so forth. The second component is data warehouse, which in a sense is a repository that combines data from various different databases to provide health managers and HR practitioners with up-to-date information on HR planning and utilization and third is the portal."* (HISP-SA staff member).

> *"We started developing the system in 2019. The architecture of the system itself has already been developed, and it's been tested which is one the things we pride ourselves on*". (Senior Manager 1, NDOH)

When asked about progress made on HRIS, another participant noted the completion of the main HRIS architectural components such as the warehouse and the registry. Additionally, the participant highlighted that other data sources had already been integrated into the data warehouse and that information from those sources was accessible from the warehouse:

> *"Much progress has been made in terms of establishing a human resource for health registry, and data warehouse. Which registry is sort of like databases that have drawn information from other sources like the primary data sources. So, I believe that has happened. With the data warehouse, there is information that you can already access coming from different sources like PERSAL."* (Senior Manager 2, NDOH).

The progression from conceptualisation to the development of the HRIS architecture as revealed by the study findings from both the document review and the interviews indicates the completion of phase one of the HRIS workplan. Based on the findings of this study, it can be deduced that the objectives in phase one of the HRIS workplan were achieved successfully.

Phase 2: Production and Institutionalisation

Description of the phase

Phase 2 entailed system testing and customisation to the National Department of Health. This phase was enabled by intensive technical support from the system developers. The activities in this phase included the creation of an enabling environment which involved the development of supportive policies and frameworks for HRIS functionality. Additionally, baseline reporting frameworks and advanced analytics, capacity building and skills transfer were initiated during Phase 2.

Progress achieved

Findings from both the document review and interviews indicated that notable progress was achieved under this phase, although some activities were still in progress at the time of the study. The HRIS had successfully undergone testing and customisation and was being utilised for various reporting and analytical purposes within the Department. According to the HRIS presentation

slides, the system was capable of producing both standard and advanced HRH reports. This aligns with the insights from one of the participants captured in the quotation below.

> *"...we also enabled the DOH to utilize the HRIS for a quite a wide range of reporting. currently reports around employment equity, race, gender disability, attrition reports, appointments, expenditure, active health workers and so forth. Quite a wide range of standard routine reporting, but also advanced analytics in terms of comparative analysis between WHO standard staffing norms versus what is currently employed at those specific health facility or district".* HISP-SA staff member

Moreover, some participants emphasised the ability of the HRIS to produce information and reports to facilitate solutions to emerging public health crises. This was demonstrated at the height of the COVID-19 pandemic when they system was used to provide essential data on health workforce numbers and categorisation across specific health facilities. This information enabled the National Department of Health to access the demand of Personal Protection Equipment (PPE) and facilitated the establishment of Electronic Vaccination Data System (EVDS) as reflected in the quotes below.

> *The system has been utilized to answer questions about health worker density, health worker categories in specific health facilities. The system also recently supported the COVID-19 response by the National Department of Health through looking at staffing numbers for PPE demands and also the EVDS for vaccination registration."* (HISP-SA staff member)

> *We've seen it [HRIS] being put under test through the COVID. And it looks like one would report that it indeed has stood the test of time. So basically, just to give you a highlight that it was also used to assist in the vaccination of health professionals, in a sense that it was a system used to draw information into the EVDS (Electronic Vaccination Data System), which was the system used for registering health professionals for vaccination."* (Senior Manager 1, NDOH)

Notably some phase 2 objectives had not been fully achieved and we still in progress at the time of this study. For example, capacity building and skills transfer to all the anticipated system users had not been actualised. This finding is reflected in the perspectives shared by some of the study participants.

> *"Currently, we are still limited in terms of capacity building and skills transfer. We have done so at national level and provincial head office. We shall also include and train district managers, CEOs of facilities and everyone down there as soon as we have given them the right to use the system."* (Senior Manager 1, NDOH).

The document review revealed that approximately 35 HRH officials, both at the national and provincial levels had since received formal training on HRIS (94). Additionally, one of the participants emphasised the plans to intensify efforts toward capacity building to empower the NDoH to fully institutionalise and maintain the HRIS system as illustrated in the quotation below.

> *"In this project year going forward, the focus will shift more and more into the building of capacity and strengthening the ability of the NDOH to manage the system as the owner."* (HISP-SA staff member).

The findings of this study, based on the interviews and the document review indicate that while remarkable progress was made under phase two of the HRIS work plan however, certain key aspects such as capacity building were not optimal at the time of the study.

Phase 3: Fully Operational HRIS

Description of the phase

According to the HRIS workplan presented in the lecture, phase 3 marks the culmination of the HRIS adoption process. This phase would be characterised by the attainment of a fully functional and operational HRIS in the health sector. At this stage, the HRIS would enable automated data source imports, routine reporting, and ad hoc reporting. As the NDoH becomes more capacitated to operate and sustain the system, technical involvement from the developers will gradually decrease, and the responsibility for system maintenance and improvements will be formally transferred to the National Department of Health. Financial inputs during this phase will primarily support ongoing system maintenance and future development improvements.

Progress achieved

Findings from this study revealed that, at the time of data collection, the HRIS had not yet reached full operational status as envisaged under this phase. While significant progress had been made in developing and testing the system, full institutionalisation and system ownership by the NDoH had not been achieved. The system remained hosted and technically supported by HISP-SA and

was yet to be fully adopted in the entire health sector, including the private sector. This is reflected in the participant's views quoted below.

> *"The system in itself is maintained, still through external third party, but we are basically in the process of transitioning the system to the National Department of Health. And we are building capacity by looking at a more holistic, enabling environment within the department through establishment of human resource information system unit, that we can build capacity on to transfer the system to and make sure that it's institutionalized."*
> (HISP-SA staff member).

Table 3.2 presents a visual summary of the progress made on each phase of the HRIS adoption in the South African health sector which depicts that Phase 1 has been completed while Phase 2 is ongoing. Regarding Phase 3, some objectives are partially completed while others are yet to be initiated.

Table 3.2: HRIS Adoption Progress

HRIS ADOPTION PROGRESS		
Phase	**Activities**	**Status**
Phase 1 (System Design and Development)	● System Conceptualization ● Proof of Concept ● Architecture Development	● Complete ● Complete ● Complete
Phase 2 (Production and Institutionalization)	● System Testing and Customization ● Baseline Reporting Frameworks ● Advance Analytics ● Capacity Building and Skills Transfer	● Complete ● Complete ● Complete ● On-going
Phase 3 (Fully Operational HRIS)	● Report generation (Ad-hoc, and power BI reports) ● Automated Data Source Imports ● System maintenance ● Development Improvements	● Complete ● Complete ● Not initiated ● Not initiated

Overall, the findings indicate that while substantial progress has been made towards the adoption of the National Integrated HRIS, the system had not yet reached full operationalisation at the time of this study. Most of the objectives under Phases 1 and 2 were achieved, while those under Phase 3—particularly full institutionalisation and nationwide roll-out—remain ongoing. These findings reflect both the complexity of implementing national digital systems and the gradual, yet steady progress made towards achieving a fully functional HRIS in South Africa.

Description of the HRIS architecture

Based on insights derived from both the document review and key informant interviews, the architecture of the HRIS, which underpins the system's design and functionality, comprises three core components: the HRH data warehouse, the HRH registry, and the user portal. Each component was purposefully designed to fulfil distinct functions, collectively contributing to a comprehensive and integrated HRIS framework.

According to information obtained from the abridged workstream chapters prepared for the national stakeholder consultation and the HRIS workshop presentation slides in Table 3.2, the HRH registry functions as an authoritative source of health workforce data across the health sector (13). It consolidates information from multiple transactional data systems into a non-transactional registry by assigning unique identifiers to each health worker within the system. The registry provides both individual-level and aggregated workforce data and is intended to enhance workforce planning and management by ensuring the availability of accurate, standardised health workforce information.

A visual presentation of the HRIS architecture with its main components is shown in Figure 3.2 below.

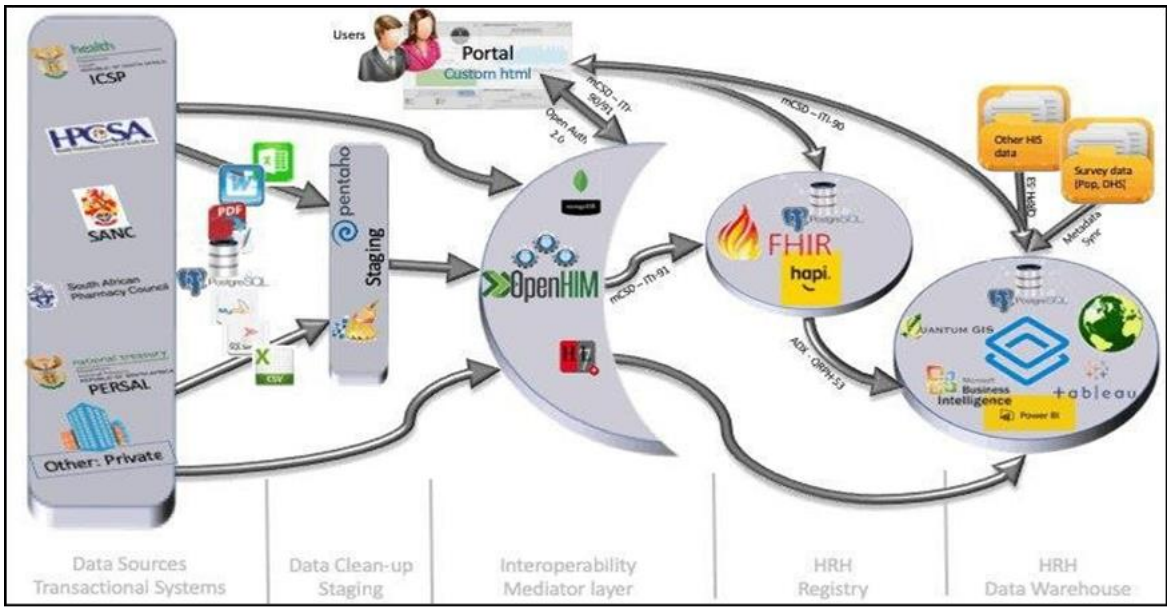


Figure 3.2: HRIS Architecture **Source: (Mathews,2019)**

The diagram above shows the different components of HRIS and the data pathway. It begins with data collection from the different sources, followed by data cleaning, entry into the interoperability medium, and finally dissemination into the registry and warehouse. The linkages between the different components of HRIS are also illuminated. As illustrated in the figure above, the HRH data warehouse marks the final output of the system, acting as the general repository for all HRH information.

3.4 Facilitators to HRIS Adoption

When the study participants were asked about their views on the facilitators to HRIS adoption within the South African health sector, four themes emerged which are: *leadership and stewardship from NDOH, secure funding, stakeholder engagements, and system advocacy*.

3.4.1 Leadership and stewardship from the NDOH

There was an overarching opinion amongst the participants that effective leadership and stewardship particularly from the NDoH was critical for HRIS adoption. Participants especially those from academia and health systems research, emphasised that the NDoH is the primary driver of HRIS initiatives and needs to drive its adoption at a national level. For instance, one of the participants highlighted the necessity for national leadership and prioritisation as captured in the quotation below.

> "*To fully actualise the integrated human resource information system, I think what you need is a combination of national leadership. I think it has to be a national initiative, driven and prioritised by the National Department of Health*." (Health Systems Academic 2)

Similarly, another participant emphasised that the NDoH should take a leading and strategic role in stewarding HRIS adoption. They argued that the Department needs to actively prioritise and guide the implementation of the system, positioning it as a key tool for effective human resource management. Given that a significant portion of the healthcare budget, approximately two-thirds is allocated to human resources, the participant suggested that prioritising HRIS would enable the NDoH to manage these resources more efficiently.

> *"The National Department of Health needs to lead, steward, mobilize, motivate, and steer the national HRH information system and prioritize it. It needs to become a priority for them. You know, we spend two thirds of the healthcare budget on human resources, and we probably don't have proper HRH information systems, therefore it needs to get priority.* (Health Systems Academic 1).

Another participant was of the view that successful HRIS adoption would require accountable leadership however her sentiments reflected some concerns about governance within the NDoH. as noted in the quote below.

> "*When you talk about this human resource information system, I understand the benefits and the need for it. But you need accountable people, people who are responsible and who understand the impact of the system. I don't think they [National Department of Health] will be able to do it. You know about the corruption within the Department of health, all departments have corruption, but people don't talk about it*." (Senior Manager 1, SANC).

On the other hand, a participant from the NDoH was of the view that political will from the Minister of Health, the Director General of Health and the Members of the Executive Council (MECs) would be essential to prioritise HRIS. He emphasised that buy-in from senior political figures such as the Minister of Health, Members of the Executive Council (MECs), the Director General of Health, is essential to ensure that HRIS is recognised as a priority. According to the participant, when political heads endorse and prioritise an initiative, it increases the likelihood that the necessary resources, funding, and institutional support will be allocated, thereby facilitating effective implementation. He regarded these political figures as highly influential with the power to prioritise any mandate if they bought into it.

> *"The political heads or leaders need to buy into the idea that we need the HRIS, when I am taking about political heads, I'm talking about the minister of health, the MECs and the Director General of health including the provincial heads. The reason being that if you don't have a same mandate or prioritised mandate, you might not have funds or resources being pulled towards HRIS you know, so you need buy-in from them in terms of understanding and prioritizing HRIS*." (Senior Manager 1, NDOH).

The overarching sentiments among these participants was that effective leadership from the National Department of Health, characterised by active stewardship, accountability and the prioritisation of HRIS initiatives, is paramount to its adoption. Secondly, political will within the

national department is essential for placing HRIS at the top of the national agenda, ensuring its prioritisation and adoption.

3.4.2 Secure funding

The participants generally viewed the availability of secure funding as crucial for HRIS adoption. For instance, one of the participants viewed HRIS as a resource intense system that needs a secure source of funding to ensure its success. This sentiment was echoed by another participant who underscored the importance of financial capacity to invest in robust and functional systems.

> *"The availability of funding, just in terms of the day-to-day operational perspective, to keep the HRIS system running, you can imagine we process close to about 4 million records from various data sources and that needs to be cleaned, mapped and organised. Then we focus on automation, then maintenance of the hardware and software, then institutionalization and continuous engagement and participant in NDOH and provincial meetings, so it's a time and resource intense process and the availability of funding is paramount to the success*." (HISP-SA staff member)

> *"You need financial capacity to invest in systems, really good systems that are properly functional*." (Health Systems Academic 2)

Interestingly, one participant from the National Department of Health revealed that they had secured the necessary funds by engaging donor partners whose financial support initiated the HRIS project.

> *"We have found a way around this issue of funding by partnering with NGOs and also international funders such as CDC who are funding information systems for government hence the project is currently underway*." (Senior Manager 1, NDOH)

The findings of this study derived from the interviews conducted, underline the availability of secure funding as a critical facilitating factor to HRIS adoption. This funding is not only essential for the initial developmental costs but also day to day operations of the system.

3.4.3 Stakeholder engagement

A review of the presentation slides revealed a diverse group of critical stakeholders involved in the HRIS operation as illustrated in Figure 3.3 below.

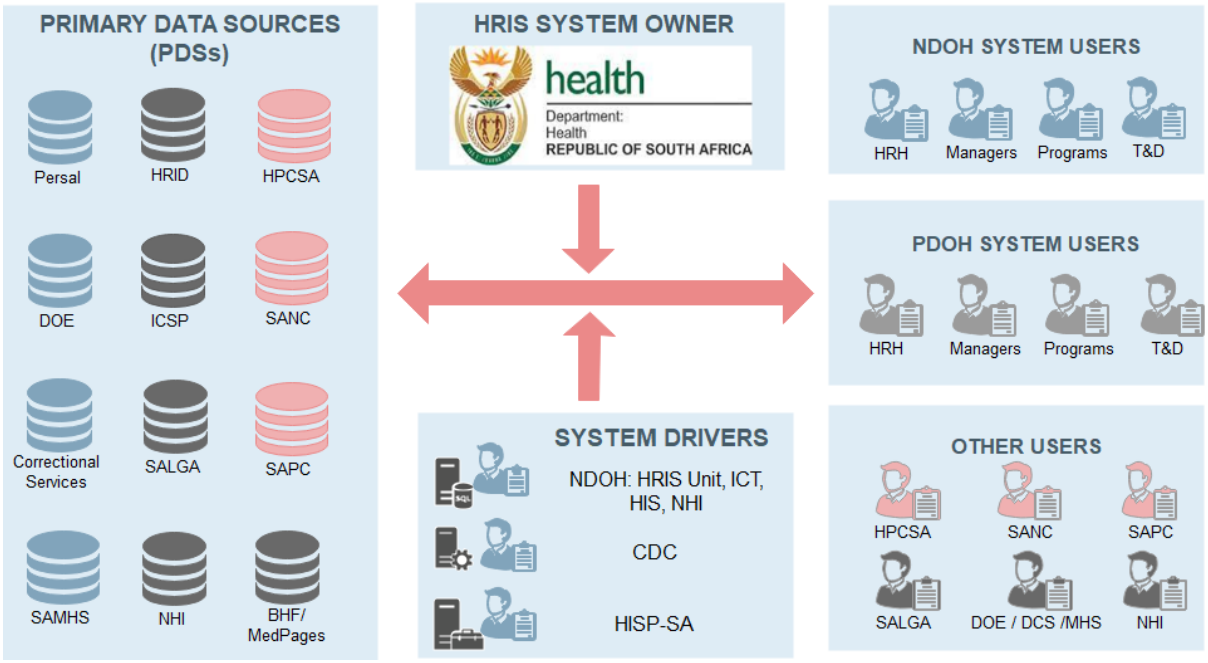


Figure 3.3 HRIS Operating Network

Source: (Khanyile,2023)

The figure above shows the HRIS operation network marked by a diverse group of stakeholders with defined roles. As seen in the image, the primary data sources include statutory bodies such as SANC, PERSAL the Board of Healthcare Funders and others. The NDoH is shown as the system owner, while the system drivers include the CDC, HISP-SA, and the NDoH. The system users are also managers at NDoH, Provincial Departments of Health and as well as the statutory bodies.

A recurrent theme amongst the participants was stakeholder engagement. For instance, one of the participants opined that the NDoH should take charge in engaging with all relevant stakeholders. He further suggested that the department should adopt a strategic approach to stakeholder engagements as articulated in the quotation below.

> "*I think the National Department of Health should prepare a draft plan with a timetable and a role for each stakeholder and their contribution. And then they should create a national HRIS steering committee which includes representatives from all stakeholders. The national department of health should bring everyone together around HRIS.*" (Health Systems Academic 1)

This statement illustrates that participants viewed structured and coordinated stakeholder engagement as essential for successful HRIS adoption. By establishing a national steering committee and a clear plan, the NDoH can ensure that all relevant stakeholders are effectively involved and that responsibilities are clearly defined.

Remarkably, the participant from HISP-SA revealed that stakeholder engagement had commenced and described the practical steps taken to engage with the different stakeholders. This highlighted that the engagement process was guided by multiple frameworks, including change management, data utilization, and data governance. According to the participant, these frameworks ensured that stakeholders including primary data sources were regularly consulted and clearly informed about the purpose, value, and proper use of their data within the system. This approach aimed to foster understanding, trust, and active participation in the HRIS adoption process.

> *"Now, what we've done is we've established a stakeholder engagement within that process that also consists of a change management framework, a data utilization framework, as well as a data governance framework. So within those frameworks, we actually established a process whereby each of the different stakeholders, as we also like to refer to them as the primary data sources, we engage with them on a regular basis with specific focus discussion, to ensure that they understand the value of participating in the process. But also how the data will be used within the data governance structure, how it will be protected, how it will be secured, how it will be utilized, and what the value is for them to participate in this process." (*HISP-SA staff member).

The participant also revealed that HRIS was designed to provide additional value to the primary data source. According to him, this strategy helped to smoothen the stakeholder engagement process.

> "*What we have done in terms of this process is to ensure that the HRIS can provide value to the primary data sources. So, we look at what kind of reporting they would want to see that are not currently provided on their own system because they don't have the necessary data sets. So, because we've got a full range of databases that we contribute to and obtain data from, we are able to do quite advanced analytics. And those reports are then feedback to the primary data sources for utilization. This helps us when we are engaging with them because they can see how the system can be beneficial to them.*" (HISP-SA staff member)

Legal compliance was also a key consideration. One NDoH participant explained that Memorandums of Understanding (MOUs) were used to formalise data-sharing arrangements, ensuring alignment with regulations such as the Protection of Personal Information (POPI) Act, which ensures the protection of personal data.

> "*I mean you would acknowledge that developing such a system, you would have to undertake what we call a stake holder engagement process which we have been doing. It's about identifying the relevant stakeholders, and one important thing it's about signing a memorandum of understanding, which talks about how data will be exchanged in appropriation of current developments like the POPI act*." (Senior Manager 1, NDOH)

This indicates that stakeholder engagement extended beyond consultation and collaboration, incorporating formal agreements and legal frameworks to protect data and ensure responsible participation.

Notably, the findings from the in-depth interviews revealed differing levels of engagement or involvement in HRIS discussions among the participants. Some participants from the NDoH and HISP-SA reported maximum involvement in the process whereas other participants reported minimal involvement as quoted below.

> "*I think I have heard about this HRIS before, but actually I haven't been very involved with it. I have only been involved now because I am part of the team busy setting up memorandum of understanding as we need to agree on which information, we will provide to the NDOH*." (Senior Manager 2, SANC).

Interestingly, one participant expressed enthusiasm about the HRIS despite not being involved in the stakeholder engagements or discussions at the time of this study.

> "*Personally, I have not been involved in this new system at all. Maybe I will be involved later on. But I am very interested to learn more about it*." (Senior Manager 2, Gauteng DoH)

According to the insights from the in-depth interviews, stakeholder engagement was generally viewed as an important facilitator to HRIS adoption. However, at the time of this study, stakeholder engagement was still at a nascent stage. As an objective under phase two of the HRIS work plan, stakeholder engagement was still an ongoing process, with limited consultation with key stakeholders and many others yet to be involved or engaged in the HRIS adoption process.

Table 3.3 below shows the different stakeholders involved in the HRIS adoption process in the South African health Sector. At the time of the study, there were varying degrees of engagement on HRIS among these stakeholders as indicated below.

Table 3.3 Stakeholders' Level of Involvement in HRIS Adoption

Stakeholder	Role in HRIS adoption	Level of involvement at the time of the study
NDOH	System owner and chief driver	High
HISP-SA	System developer	High
CDC	Funding partner	Moderate
Statutory bodies (HPCSA, SANC, and SAPC)	Primary data source and system user	Low
Treasury (PERSAL)	Primary data source	Moderate
Provincial Departments of Health	System users	Moderate
Department of Education (for health training institutions)	Primary data source	Not yet involved
Private health sector (BHF)	Primary data source	Not yet involved
Others (SAMHS, DCS)	Primary data source	Not yet involved

The stakeholder categories presented in Table 5 were primarily derived from the literature and documents reviewed during the study, which identified key actors involved in HRIS adoption within the South African health sector. These respective categories highlight the degree of involvement and contribution of stakeholders across different phases of HRIS adoption at the time of this study. High-level involvement refers to consistent participation from the conceptualisation of the HRIS through its conceptualisation, development, and up to the time of this study, including active input and resource provision. Moderate involvement refers to partial engagement, where stakeholders contributed in specific phases but not comprehensively such as the CDC, which primarily provided funding but had limited participation in system conceptualisation and development. The low involvement category indicates stakeholders who had minimal engagement at the time of the study. Specifically, these stakeholders had only limited exposure to HRIS-related discussions or activities, such as attending a few meetings or having occasional conversations about the system, without constant active participation. It is important to note that these classifications reflect stakeholder roles only at the time of the study, and their level of engagement may have evolved since then.

3.4.4 System advocacy

Although not a dominant theme, system advocacy was mentioned by some participants as a facilitating factor to HRIS adoption. One participant suggested a multisectoral advocacy strategy involving a diverse team of organisations working together to lobby and advocate for the HRIS. According to him, this approach can be useful in prioritising HRIS on the national agenda.

> *"You've got to have appropriate advocacy. Uh, you've got to use all the different tools to influence it [HRIS], and the National Department of Health has a lot of influence and authority. It [HRIS], needs to be raised in consultations that the national department has with stakeholders, the health activist organizations like [Advocacy group name] that need to be brought on board to understand the consequences of not having an HRH information system and have that added to what they lobby for because often when they start advocating and lobbying, and prioritizing something, people take notice."* (Health Systems Academic 1)

The participant further underscored the need to translate research into actionable policy and practice. In his opinion, research on HRH information systems should not be limited to published articles but should translate into policy briefs that clearly articulate HRIS's necessity.

> *"You need some academic articles on the implications and impact of the lack of an HRH information system. But then you have to translate research into policy and practice, so it is not good enough to do the research and publish it. You have to create advocacy documents and policy briefs calling for this [HRIS] and spelling out the gap.* (Health Systems Academic 1)

When asked about their perception on what could facilitate HRIS adoption, a participant from the provincial department of health emphasised the urgency to create awareness for the system among all the implementing stakeholders.

> *"I think for something to be implemented; it should be marketed to the implementers, so I don't think much efforts have been made to create awareness and train other stakeholders. We need to be made aware of and trained on this system*. (Manager 2, Gauteng DoH)

This study found that while most participants viewed system advocacy as a facilitating factor, there were practical gaps evidently because there were some participants who reported limited understanding or awareness of HRIS. that they still did not fully understand or were aware of the

HRIS. This may be due to the system's novelty, as it is a recent development that is just being introduced to stakeholders.

3.5 Barriers to HRIS Adoption

The final objective of this study was to explore participants' perspectives on the barriers to HRIS adoption in the South African health sector. The participants' responses to the inquiries about these barriers led to the identification of the following themes: *inadequate institutional capacity, lack of system training, change in organisational leadership, top-down approach to policy adoption, competing priorities, and system complexity.*

3.5.1 Inadequate institutional capacity

The lack of institutional capacity, especially at the National Department of Health, to develop and maintain the HRIS emerged as a critical barrier to its adoption based on the participants insights. Capacity in this context mainly entailed internal expertise within the department to develop and maintain the HRIS. One key issue that arose from the interviews is that the NDOH as the primary driver of HRIS lacked skilled personnel trained in information systems development. As a result, they have been forced to rely on external developers to build the system.

> *"We have a challenge with capacity, you know when you develop such a system, you need skilled personnel, people with the know-how and at the level of skill you want. You know, in government we don't have developers, so we have to outsource these services*." (Senior Manager 1, NDOH)

Moreover, participants emphasised the nascent stage of the HRIS unit within the National Department of Health. The unit has not been fully established and remains understaffed, currently compromising only a director, an assistant director, and a secretary. However, participants noted that there are plans in place to recruit more skilled personnel to strengthen the unit, contingent upon the availability of funds.

> "*It [HRIS unit] is a fairly new unit. It's just the director, one assistant director and the secretary, so Yeah, we are busy sourcing relevant needed numbers to have a fully flagged directory. So, there is basically an organogram. We have identified needs of the posts to*

be filled which now it's a matter of unblocking funds to get those posts filled." (Senior Manager 1, NDOH)

"We want to establish a fully functional unit that will manage the human resource information system. We do not have that on structure right now. At the moment, it's been managed by a director with support from two deputy directors who I believe will take over the management aspects of the system including training. We will also recruit additional personnel to support the unit with resources permitting. At the moment resourcing of the unit is not optimal." (Senior Manager 2, NDOH)

A participant from HISP-SA articulated the organisation's vision for the project moving forward, highlighting their plans to enhance capacity of the NDOH to take over and manage the system as the owners.

*"The capacity at the national department, provincial departments is quite a challenge. It's a new approach and we have to build capacity and train people up not only from a system utilization point of view, but also from system maintenance and the architecture development. That is, in this project year going forward, the focus will shift more and more into the building of capacity and strengthening the ability of the NDOH to manage as the owne*r." (HISP-SA staff member)

3.6.2 Lack of system training

The lack of system training emerged as a critical barrier to the adoption of the HRIS. Some participants expressed concerns that without empowering system users with the necessary skills, especially at the district and facility levels, the quality of the data collected would be compromised. The role of the NDOH in facilitating these training sessions was underscored, with some participants asserting that the NDOH should empower the system users at the lower levels otherwise the HRIS adoption would be challenged.

"The national department of health should empower the people at lower levels by training them on this system otherwise it will be futile. They need to transfer Knowledge and skills to people in the districts and facilities. How can you get quality data if you don't empower the people collecting and capturing the data. You see, I went to one of the facilities and I saw beautiful graphs on the notice board, and I asked one of the data captures what the graphs were about and they didn't even know. National department should have dissemination of information from top to bottom they you can be sure that you are going to get good quality data." (Senior Manager 2, SANC)

Further illustrating the challenges associated with inadequate training, another participant acknowledged that they had not been trained on HRIS yet. They emphasised the need for the NDoH to prioritise the education and training of stakeholders of the HRIS system.

> *"I think they [NDoH],] need to educate and train people on what this system is and how it can be used. We have not been trained, maybe it will happen but so far, it has not yet happened. Like I said I spoke to three other managers, and they said they have not been trained also."* (Senior Manager 2, Gauteng DoH)

3.5.2 Change in organisational leadership

Changes in institutional leadership emerged as a notable barrier to HRIS adoption according to the participants' views. A participant from the NDoH highlighted how the departure of a key individual who was leading the HRIS initiative created a significant setback in terms of the system's developmental progress. This setback necessitated the creation of new strategies, and the mobilisation of resources to revitalise the system's progress. Starting over was a particularly daunting task that was exacerbated by financial constraints within the department.

> *"Another challenge we had was the change in stewardship of this particular initiative. The person that was driving it, or who was at the forefront, you know, unfortunately, left the department at some point. And, you know, so it became, it became another challenge, you know, to, to get him replaced, and, you know, to resuscitate the project, particularly, because it was at the point when we're also struggling financially. So even just having a new person to take over meant, you know, going back to the drawing board in a way to even start by mobilizing resources and resuscitation this this this work*." (Senior Manager 2, NDOH)

Another participant echoed these statements, noting that the perpetual changes in leadership may have derailed the HRIS adoption processes. Succession of Ministers and Director -Generals, with each bringing their own priorities and agendas, has led to stagnation in the HRIS adoption process. The participant referenced a ministerial task team that was appointed under a committed leader, which provided hope that HRIS development was going to take off. However, the departure of this leader left a void that hindered progress. Nonetheless, the participant expressed optimism that under the current administration, HRIS might gain traction.

> "*I can argue that there's been a series of changes in leadership at the national department of health. The one minister left, and a new minister took over, and then there's a third minister. So, the ministerial task team was appointed by [Minister's name], under the*

leadership of [DG's name], who was very committed to human resources for health issues. And then there was a gap when the acting DGs and the minister left under a cloud. Now, [new DDG's name], has been appointed as the new DDG for human resources, so maybe with him and [MoH's name], as the minister, we shall see movement again." (Health Systems Academic 1).

Additionally, another participant also reported that changes in management within other stakeholder organisations, such as the primary data sources, posed as a challenge to HRIS adoption. This participant described the challenges associated with engaging new management teams at these organisations, noting that such changes often require reintroducing the HRIS to the new managers and starting the engagement process from scratch to secure their support. They acknowledged that this process can be time-consuming and may cause delays in the HRIS adoption process.

"*Another challenge we faced was, every time a primary data source changes management, a new management team comes on board, we have to repeat the process of engaging with them from scratch to get them on board which leads to delays and takes a lot of time*." (Senior Manager, NPC)

3.5.3 Top-down approach to policy adoption

When asked about their views on the possible barriers to HRIS adoption, one of the participants highlighted the historical nature of the top-down approach to policy implementation in the South African health sector. They asserted that most national policies are usually developed at the top level of national health governance and then passed down to the lower levels such as the district and facility levels without their full participation or involvement. The participant further expressed that this top-down approach can undermine HRIS adoption as it denies the lower-level stakeholders the opportunity to share their unique systems needs and hinders their comprehensive understanding of the system. The quotation below reflects the participants views.

"In the past, all the national attempts have been very centralized so very top-down without proper consultation with the provincial, district, and facility levels. I do think you need a process of consultation and providing input from the bottom-up. Because any kind of information system is only useful if it is then used for planning and management. The national department has to understand what the planning requirements are in a facility, in a sub-district, in a district and even in the province and empower them to be able to make use of such a system." (Health Systems Academic 2)

The participant further emphasised the challenges associated with a centralised decision-making approach, noting that the system is unlikely to function effectively if individuals at the lower levels of governance do not fully understand or support the system.

> "*The problem with national systems that are imposed is always that, you run into problems with implementation. So you can design a fancy system at the top, but if people either don't buy into it further down the system or they don't know how and why they collect information, it will never work properly, and we have seen that with other information systems as well." (*Health Systems Academic 2).

Drawing from their extensive experience in the health system, the participant observed that facility and subdistrict-level staff are often tasked with collecting information without understanding its purpose or relevance. They noted that this top-down approach fosters a negative perception of the information system, making it appear unfriendly and burdensome, which in turn affects the quality of the data collected.

> *"I think the user friendliness and usefulness of systems throughout the health system and not just at national level is important. Too many of the information systems that I've come across in the health sector are about people in facilities and subdistricts mindlessly being told to collect information, passing it up to the system and they don't know why they're supposed to do it. It just imposes a huge workload on them; it's then invariably done quite badly because it's just a chore. So, it impacts the quality and its simply not useful for the people who run the system at the lower levels."* (Health Systems Academic 2).

In summary, the findings suggest that the historical top-down approach to policy implementation in the South African health sector contributes to negative perceptions and limited engagement among lower-level users. When facility- and district-level staff are not empowered, educated, or consulted, they often view the system as burdensome and unfriendly, which affects both their attitudes and the quality of data collected. These insights highlight the critical importance of participatory engagement, effective communication, and empowerment strategies in facilitating successful HRIS adoption and ensuring that information systems are both usable and meaningful at all levels of the health system.

3.5.4 Lack of a specified budget allocated to HRIS

The participants from the National Department of Health were of the view that the lack of a dedicated budget allocated to HRIS derailed the development of the system. They mentioned that this chronic lack of funds led them to seek supplementary funds from the national treasury to support HRIS, however they were not successful in attaining those funds which led to initial HRIS development failures. These views are reflected in the quotations below.

> "*One of the major challenges we faced was the issue of funding or budget because the department didn't have capacity in terms of budget to develop the system and that has seen delays in the development of the system. "*(Senior Manager 1, NDOH).

> "*When HRIS came around, the plan was to try and put forward a bid to national treasury as well as look for other alternative sources of funding. I think perhaps that's the reason it failed first time around, because the process started, we were running parallel processes, while we were engaging with treasury in hopes that they would fund the project, which didn't happen*." (Senior Manager 2, NDOH)

3.5.5 Competing priorities

There was an overarching view among participants from specific stakeholder institutions such as the National Department of Health and HISP-SA, that competition priorities on the national health agenda can derail some programs. One participant shared that their department faces various issues, yet they are allocated a budget with finite resources to address those issues. They end up prioritising some issues or programs over others.

> "*There are always issues of prioritizing you know, within the budget envelope that you receive from the national treasure. When the budget is not forthcoming, you have to reprioritise and do what is feasible.*" (Senior Manager 2, NDOH)

The COVID-19 pandemic was highlighted by one of the participants as one of the pressing issues that diverted resources from the HRIS initiatives as expressed in the quotations below.

> *"Another challenge we had, obviously with project implementation revolved around the COVID-19 impact, there was a complete shift in priorities at the national department, obviously and we had to adjust the system process quite significantly to enable maintaining momentum. Also, it [HRIS] is a CDC funded project and when COVID-19 struck, a significant chunk of CDC funding was shifted to COVID support. And that then reduced funding available for HRIS development activities." (*HISP-SA staff member)

> "*In 2020 /2021, you know, that the country was hit with COVID and as we develop the system, we had to reprioritize our resources. So most of us with certain skills and knowledge had to be brought in to assist with COVID challenges rather than concentrating on our normal daily jobs like the HRIS program." (*Senior Manager 1, NDOH)

3.5.6 System complexity

Although not a dominant theme, one of the participants expressed concerns about the level of user friendliness of the HRIS system. According to the participant, many system users, especially at the facility and district level, are often simply instructed to collect information without knowing why, and how to do it. The participant added that this approach breeds a negative attitude about the system among the lower-level users.

> "*I think the user friendliness and usefulness of systems throughout the health system and not just at national level is important. Too many of the information systems that I've come across in the health sector are about people in facilities and subdistricts mindlessly being told to collect information, passing it up to the system and they don't know why they're supposed to do it. It just imposes a huge workload on them, it's then invariably done quite badly because it's just a chore. So, it impacts the quality and its simply not useful for the people who run the system at the lower levels.*" (Health Systems Academic 2)

3.6 Chapter Summary

The findings of this chapter reveal that remarkable progress has been made towards the adoption of HRIS in the South African health sector, as evidenced by the completion of the HRIS architectural development. However, the integration and full adoption of the system across the entire health sector remains an ongoing process influenced by a complex interplay of facilitating factor and barriers.

CHAPTER 4: DISCUSSION

4.1 Introduction

This chapter dissects the study findings presented in the preceding results chapter, aligning them with the study objectives and existing literature to identify commonalities, discrepancies, and new insights that could contribute to understanding HRIS adoption in the South African health sector. This analysis will elucidate the unique contextual factors in South Africa while highlighting challenges and best practices derived from the existing body of knowledge.

4.2 Summary of the Study Findings

This exploratory qualitative study aimed to investigate stakeholders' perceptions regarding the adoption of an integrated Human Resource Information System (HRIS) within the South African health sector. At the time of this study, HRIS adoption in the South African health sector was at a nascent stage. The system's architecture, comprising the HRH registry, data warehouse, and user portal, had been developed. However, it had not yet been fully adopted. In the context of information systems, adoption refers to the complete implementation and institutionalisation of the system, integrating it into the routine core functions of an organisation (95). In this study, it was discovered that the national HRIS had not yet been fully institutionalised throughout the entire health sector, nor was it fully integrated into the national HRH planning activities. At the time of the study, the primary stakeholders who were actively involved in the HRIS adoption process were the NDoH and HISP-SA, while other relevant stakeholders such as the South African Nursing Council (SANC) were newly getting involved. Nonetheless, participants generally perceived HRIS adoption as significantly beneficial, acknowledging its pivotal role in strengthening Human Resources for Health (HRH) planning and management.

The study identified several factors facilitating HRIS adoption, including leadership and stewardship, secure funding, stakeholder engagements, capacity building, and system advocacy. Conversely, barriers to HRIS adoption comprised of the following factors: institutional changes in leadership, centralized decision-making, competing priorities, and system complexity. In the

section below, the key findings of the study are discussed in alignment with the study objectives and existing literature.

4.3 Progress of HRIS Adoption in the South African Health Sector

To assess the advancements in the adoption of HRIS, it was necessary to first examine the adoption strategy as delineated by the NDoH. This examination uncovered a phased approach to HRIS adoption, consisting of three distinct, time-bound phases, each with specific objectives, as detailed in the results chapter. These respective phases included, system design and development (Phase 1), production and institutionalisation (Phase 2), and fully operational HRIS (Phase 3). The findings indicate that phase one, which involved the development of the system architecture, had been completed, while phases two and three are still underway. Notably, this phased approach is not strictly sequential, allowing for the attainment of objectives from subsequent phases prior to the completion of earlier phases. For example, this study revealed that the system had already been used for routine and ad-hoc data reporting - a phase three objective - despite the ongoing stakeholder engagement, which is a phase two objective.

The phased approach to HRIS adoption observed in South Africa aligns with the WHO guidelines which highlight five critical steps for successful HRIS adoption (96). These steps include stakeholder engagement, infrastructure development, integration of HRIS with existing systems, supportive use of data, and ensuring sustainability and continuous system improvements (96). Similarly, other countries such as Mozambique, Kenya, and Uganda have adopted this phased approach in their respective health sectors (55,97,98). Although each country has tailored the process to its unique context, they have all prioritised stakeholder engagement and infrastructure development as fundamental steps, followed by system integration and effective data utilisation. These country experiences highlight the flexibility of the WHO's framework, wherein progress is achieved incrementally. Notably, as evidenced in the South African case, objectives from later phases, such as data report generation, can be achieved while earlier-phase activities, like stakeholder engagement, are still ongoing.

4.4 Facilitators of HRIS Adoption

This section discusses the key facilitators of HRIS adoption as derived from the study results.

4.4.1 Leadership and stewardship from the NDoH

There was a strong consensus among the study participants that effective leadership and stewardship from the NDoH is paramount for the successful adoption of the HRIS in the South African health sector. Existing literature underscores the critical role of top management support in innovation adoption (42,49). Top management support typically entails all policies and efforts undertaken by an organization's top management to facilitate and promote the use of new technological innovations (49). In this context, the NDoH serves as the principal governance body within the South African health sector. Participants in this study emphasised that given its authoritative position, the NDOH must assume a proactive role in providing strategic direction, mobilising resources, engaging stakeholders, and prioritising HRIS on the national health agenda.

The findings from this study present a nuanced perspective on NDoH's leadership and commitment to HRIS adoption. While the recent development of the HRIS architecture is a commendable milestone, the department has expressed intentions to implement an integrated HRIS since 2006 as evidenced by successive HRH strategy documents (11,22,23). However, actual development only commenced in 2019. This significant temporal gap may suggest low levels of commitment, a concern echoed by some participants who highlighted historical inefficiencies within the Department of Health. This finding is consistent with existing literature on the role of leadership in innovation adoption, particularly within the health sector. Laukka et al (99) found that senior managers and executives play a critical role in creating a conducive environment for health IT adoption, mobilising resources, providing technical support, and navigating challenges such as resistance to change (99).

Similarly, another study suggests that supportive leadership fosters interdepartmental collaboration among all the relevant departments, ensuring alignment with organisational goals, and promoting user engagement and system training (100). Moreover, studies from other developing countries underscore the importance of top leadership support in HRIS adoption. For instance, Oman's Ministry of Health demonstrated strong commitment by establishing a specialised committee led by the minister to oversee the HRIS adoption process (101). Likewise,

a review of eight sub-Saharan countries' experiences of HRIS implementation found that strong governance, leadership and coordination by the government facilitated successful HRIS's adoption (66). In contrast, evidence from Tanzania illustrates the adverse effects of inadequate top management support in the HRIS adoption process (56). Bureaucratic hurdles resulted in major delays in HRIS adoption within the Ministry of Health, attributed to the failure of some top management to act promptly (58). Similarly, evidence from Ethiopia demonstrates how the lack of top management support led to low stakeholder enthusiasm and failure to work cohesively as a team, thereby hindering the country's HRIS adoption process (10).

In conclusion, effective leadership and consistent commitment from top leadership such as the NDoH, are critical for the successful adoption of the HRIS. The department must provide clear, time-bound deliverables to ensure accountability and maintain momentum. Furthermore, continuous assessment of the progress, challenges, and solutions is instrumental to the actualization of HRIS.

4.4.2 Secure funding

The findings of this study highlight the importance of secure funding as a critical facilitating factor for HRIS adoption. As suggested by Shahbana et al. (102), HRIS adoption can be a costly endeavour. The adoption process typically entails costs associated with hardware, such as computer and software installation costs, network setup, training, stakeholder facilitation, data entry and cleaning, and technical follow-up (103). In many developing countries, where governments face inherent fiscal limitations, HRH data challenges are exacerbated by the absence of an integrated HRIS (4). Consequently, HRM in these countries usually relies on outdated and inefficient information systems for HRH data (4). Securing the necessary funds to facilitate HRIS adoption is therefore deemed a fundamental facilitating factor (102). Partnerships with global donors have proven beneficial in enabling developing countries to adopt HRIS within their health sectors (104).

In the South African context, HRIS adoption is advancing through collaborative efforts with the Centres for Disease Control (CDC) as a funding partner. This partnership has alleviated the financial pressures on the NDoH, which has been a long-standing challenge and ultimately

initiated the HRIS development. This study revealed that the CDC provided the initial funding to commence the HRIS adoption process and support the architecture development. However, the NDOH is expected to facilitate future tasks such as system maintenance and improvements. This approach is consistent with standard donor protocols observed in other developing countries (55,56,62,105). The future funding strategy for the national HRIS, which clearly outlines how the HRIS will be financed going forward, remains unclear. This lack of clarity renders the system vulnerable to potential resource allocation constraints, which have been consistently cited as organisational challenges with the NDOH (106).

Similar cases have been observed in other low- and middle-income countries (LMICs) where HRIS or broader health information systems were initially established through donor funding. For instance, in Rwanda, the Ministry of Health addressed this challenge by progressively integrating HRIS financing into the national health budget, thereby ensuring that system maintenance and upgrades became part of recurrent government expenditure (118). Likewise, In Kenya, the government has taken on the financial responsibility to sustain their HRIS (98). South Africa could also consider such mechanisms to ensure sustainability of the novel HRIS.

4.4.3 Stakeholder engagements

Rigorous stakeholder engagements emerged as a critical facilitating factor for HRIS adoption in this study. HRIS adoption within the South African health sector is a multisectoral process involving a diverse group of stakeholders, each with distinct roles. These stakeholders include the NDOH, the provincial Departments of Health, HISP-SA, the CDC, primary data sources such as the statutory bodies, and other system users as shown presented in results section earlier. Stakeholder engagements had commenced at the time of this study and were expected to continue as the HRIS adoption process advanced. The initial engagements were primarily limited to the NDoH, HISP-SA, and the CDC as the funders; however, other stakeholders were in the process of being approached and integrated into the collaborative efforts.

The stakeholder engagement process commenced with the identification of the relevant stakeholders and the definition of their unique roles in HRIS adoption. Subsequently, meetings were convened to officially delineate these roles, followed by the signing of Memoranda of

Understanding (MoUs) between the relevant stakeholders. These agreements aimed to ensure data security and alignment with the prescribed data collection protocols. Literature supports this collaborative approach to HRIS adoption, highlighting its capacity to promote cohesion and mitigate change resistance among the stakeholders (107).

Evidence from similar developing countries underscores the importance of engaging all the relevant stakeholders in HRIS initiatives at an early stage (65,71). This approach ensures that stakeholders' inputs, needs, and concerns are comprehensively considered throughout each phase of the adoption process (65). For example, the South-South collaboration between Kenya and Zambia demonstrates how highly collaborative approaches to HRIS adoption can facilitate and strengthen the adoption process (62). In Mozambique, stakeholder engagement played a pivotal role in the successful implementation of the HRIS (eSIP-Saúde) (54). The Ministry of Health worked collaboratively with multiple ministries and agencies to build on existing systems, fostering broad acceptance and ownership while achieving significant cost savings. Continuous stakeholder involvement supported by an online community of practice that enabled users to suggest modifications and validate data ensured that the system evolved dynamically in response to user needs and strengthened intersectoral coordination (54). Similarly, In Zimbabwe, the development of the ZHRIS reflected strong stakeholder participation, as the system was designed to address the specific needs and priorities identified by national actors. Although not fully aligned with international standards, this context-driven approach underscored the importance of involving local stakeholders to ensure system usability and sustainability (107). Ultimately, the collective evidence from these countries shows that rigorous stakeholder engagements are fundamental facilitators for HRIS adoption, promoting cohesion and long-term system sustainability.

4.4.4 System advocacy

System advocacy emerged as a facilitating factor of HRIS adoption. As participants in this study expressed, system advocacy entails creating awareness about the system and ensuring that it remains a top priority on the health sector's agenda. Effective advocacy enables a broader understanding of HRIS among relevant stakeholders and decision-makers, assisting them in recognising the system's potential to strengthen HRH management (109). This study found that the NDoH and, HISP-SA primarily assumed the HRIS advocacy role. They described their

approach as *"applying constant pressure by continuously being in the face of the users most of the time"*. This approach presents a proactive form of advocacy, ensuring that HRIS remains visible and that stakeholders are constantly engaged in discussions about it. However, some participants expressed limited knowledge of the system, with some even declining to participate in the study, citing a lack of awareness of HRIS. This disparity raises questions about the level of current advocacy efforts.

There was broad consensus among participants that system advocacy plays a pivotal role in facilitating HRIS adoption. Drawing from this study's findings and corroborating experiences in other contexts, it can be argued that effective advocacy not only highlights the potential benefits of HRIS but also underscores the risks associated with its absence, thereby fostering a stronger foundation for understanding and accepting HRIS (55,61). Effective advocacy not only highlights the potential benefits of HRIS but also draws attention to the risks associated with its absence. By raising awareness and promoting understanding among key stakeholders, advocacy helps create an enabling environment for the system's acceptance and integration within the health sector. The influence of system advocacy is reflected in global efforts led by multilateral organisations such as the World Health Organization, which has consistently called on countries to implement national HRIS (5,6). As a result, many countries, including South Africa, have taken steps to integrate HRIS into their health systems—demonstrating the impact of sustained advocacy on adoption processes.

Experiences from other contexts further show that structured, collaborative, and multi-stakeholder advocacy is crucial for successful HRIS implementation. In Kenya and Zambia, for instance, advocacy and knowledge-sharing were embedded within a South–South collaboration that involved stakeholder sensitisation, leadership engagement, and technical support, collectively advancing HRIS uptake (61). Likewise, Tanzania's national rollout of HRHIS was strengthened through continuous communication, policy dialogue, and engagement with regional health offices, which fostered awareness and local ownership (55). In Uganda, regular stakeholder meetings and training sessions were central to building understanding of HRIS's purpose and value among decision-makers and health managers (62). These lessons underscore the necessity for system advocacy to create awareness and demonstrate system value.

4.5 Barriers to HRIS Adoption

This section discusses the key barriers of HRIS adoption as derived from the study findings.

4.5.1 Inadequate institutional capacity

Inadequate institutional capacity, particularly within the NDOH, emerged as a significant barrier to HRIS adoption. As the system owner and primary driver of HRIS initiatives, the NDoH faces serious capacity gaps that have historically undermined its ability to adopt HRIS. These gaps are characterised by the absence of a fully functional and operational HRIS unit, solely responsible for HRIS at the NDoH. Although the recent establishment of the HRIS unit at the NDOH is a promising development, it is still relatively new and suffers from a critical shortage of skilled personnel in human resources and information systems, with only three personnel employed within this unit. This lack of in-house expertise creates a dependence on external technical support, which presents unique challenges, including the need to channel substantial funds out of the department. Moreover, significant concerns for long-term sustainability, particularly in terms of system maintenance and continuous improvements, arise as a result of the reliance on external support.

Furthermore, the lack of financial resources allocated to developing and formalising the HRIS unit within the department exacerbated these challenges, making it difficult to maintain momentum for HRIS activities. The capacity challenges also trickled down to the provincial departments of health, which reported similar constraints. In countries such as Ethiopia, institutional capacity challenges such as the lack of appropriate infrastructure and skilled personnel have been reported to impede HRIS implementation (10). Similar capacity challenges have been documented in Pakistan (110). Such cases highlight the adverse effects of inadequate institutional capacity on the HRIS adoption process and offer valuable insights for countries seeking to implement HRIS, including South Africa.

4.5.2 Change in institutional leadership

A key barrier to the adoption of the national integrated HRIS in the South African health sector was the frequent changes in institutional leadership, particularly within the National Department of Health (NDoH). The study already established effective leadership as a critical facilitating factor to HRIS adoption. However, the frequent changes in leadership positions, including the Ministry

of Health and Members of the Executive Council, have led to varying degrees of commitment to HRIS, ultimately delaying its progress. For instance, when a minister committed to advancing HRIS was replaced by another with differing priorities, the HRIS project would lose momentum, resulting in unnecessary delays in its adoption. This disruption in leadership continuity adversely affects HRIS prioritisation and resource allocation, which are vital for sustained and well-coordinated efforts towards HRIS adoption.

Evidence from various settings, particularly in Africa, demonstrates that frequent changes in leadership can significantly disrupt health reforms (119). For example, studies examining health leadership in African contexts have shown that recurrent government transitions and political instability undermine continuity in health sector leadership, thereby derailing ongoing reforms and negatively impacting the overall performance of health systems (120). While these findings primarily relate to political leadership, they are directly relevant to the health sector, as the Minister of Health and Members of the Executive Council (MECs) serve as political heads responsible for health governance. Internationally, similar patterns have been observed; for instance, the implementation and continuity of the Affordable Care Act (commonly known as “Obamacare”) (121) in the United States has been influenced by changes in the administration, highlighting how shifts in political leadership can affect the progression of health reforms. These observations underscore how leadership changes can impede the adoption and sustained functioning of health initiatives, such as the Human Resource Information System (HRIS).

Moreover, this issue extended to the statutory bodies, necessitating renewed engagements whenever there were leadership changes to align them with the overarching HRIS plan. The constant necessity to reestablish commitment and familiarise new leaders with HRIS led to the loss of valuable time and resources in the process. To ensure consistent progress, the NDoH would benefit from implementing structures that ensure continuity in HRIS priorities, regardless of the inevitable changes in leadership. HRIS objectives should be institutionalised within the department’s core strategies to prevent the perpetual loss of momentum caused by changes in institutional leadership.

4.5.3 Centralised decision making

Centralised decision-making can act as a barrier to the successful adoption of HRIS, particularly in a complex system such as the health sector. In South Africa, much of the system conceptualisation, design, and development were undertaken by top-level stakeholders, notably the NDoH and HISP-SA as the developers. This highly centralised, top-down approach allowed little to no input from lower levels of the health sector, such as provincial and district offices, who are ultimately the system users. While some literature suggests that centralised organisations can achieve successful information system adoption due to swift decision-making and minimal need for lower-level buy-in (78), in larger and more complex systems with multiple actors and hierarchical control, centralisation can impede innovation adoption (102).

At the time of this study, the national HRIS had not yet been rolled out across the health sector. Participants expressed concerns regarding perceived system complexity, noting that if users view the system as cumbersome or not user-friendly, it may be regarded as an additional workload. Such perceptions can increase resistance to adoption and effective system usage. Perceived system complexity is a well-documented barrier to innovation adoption (42). For example, studies in Tanzanian public organisations and in Bangladesh report that HRIS systems perceived as complex or difficult to navigate have lower adoption rates, highlighting the critical role of usability in successful implementation (114,115).

Moreover, the national integrated HRIS is not intended to replace existing HRH information systems but to integrate with them, necessitating interoperability. This requirement introduces an additional layer of complexity, particularly because the system was developed without comprehensive consultation with all relevant stakeholders. Consequently, it remains unclear how interoperability challenges will be addressed when linking multiple systems.

South Africa employs a decentralised system of governance, where provinces manage healthcare processes within their jurisdictions, while the NDoH develops national policies to ensure standardisation, consistency, and equity across the health system (111). Although this approach is valuable for creating streamlined national plans, challenges can emerge during roll-out at lower levels, including low enthusiasm and resistance to change, as evidenced in other contexts such as

Algeria (112). In the HRIS case, low-level stakeholders had minimal involvement in the system's conceptualisation, design, and development, despite the system being intended for use across all administrative levels. This exclusion poses a significant barrier to both adoption and effective usage. A more inclusive decision-making approach that incorporates consultation and participation from all stakeholders would likely enhance user buy-in and foster successful HRIS adoption.

4.5.4 Competing priorities

In resource-constrained environments, especially in developing countries, competing priorities can act as a significant barrier to the adoption of HRIS. These countries face pressing demands to proportionally allocate their finite resources to numerous health-related issues (36). This study found that the sudden onset of the COVID-19 global pandemic necessitated stakeholders such as the NDoH, and the CDC to divert resources toward combating the pandemic, temporarily pausing the HRIS project activities. This shift in focus not only interrupted the progress of HRIS adoption, but it also demonstrated how competing priorities can create substantial barriers to successful adoption. Given the complex and dynamic nature of the health sector, competing priorities are likely to remain a constant factor due to the intersection of resource constraints and unpredictable health emergencies. Consequently, some initiatives such as HRIS may need to be defunded and deprioritised in favour of more immediate and visible concerns (113).

4.6 Chapter Summary

This study identified several interrelated factors influencing the adoption of a national integrated HRIS in the South African sector. Interestingly, many of these factors present opposing influences. For instance, access to a reliable source of funds is a critical facilitator, while the lack of funds can act as a significant barrier to HRIS adoption. Moreover, most of the factors discussed pertain primarily on the organisation level, particularly the NDoH, which serves as the primary driver of HRIS adoption. Addressing these factors will strengthen the facilitators and mitigate the barriers, thereby creating a more conducive environment to foster successful HRIS adoption

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This Master of Public Health study sought to explore the factors that influence the adoption of the national integrated Human Resource Information system (HRIS), which is a relatively novel system in the South African health sector. Previous studies on HRIS in the South African health sector (79,116,117,118) have provided valuable insights into system performance and risk implications of ineffective HRIS usage in the South African health sector. While these studies offer an important foundation, few, if any have specifically examined the facilitators, barriers, and progress made towards the adoption of the national integrated HRIS from the perspective of the relevant stakeholders. Recognising these factors is essential for ensuring the successful adoption of the national integrated HRIS.

Global evidence underscores that digital health success in low- and middle-income countries (LMICs) is less a function of technology and more a product of an enabling policy environment, including strong governance, sustainable financing, and strategic planning (2.) Studies indicate that key enablers include strong national leadership, secure and sustainable financing, integration with existing health information systems, capacity-building initiatives, and active stakeholder engagement at all levels, from ministries to provincial authorities and frontline staff. Policies that mandate HRIS implementation, provide clear guidelines for interoperability, and incentivize user participation have been shown to improve adoption rates in comparable LMIC settings (122). Synthesizing these global strategies with the findings from this study provides a policy-oriented framework for recommendations. Based on the study findings, the following recommendations are provided to support and enhance HRIS adoption in South Africa.

5.2 Study Recommendations

Most of the recommendations put forth as a result of this study are aimed at organisational or departmental level, given that HRIS adoption is undertaken at that level.

5.2.1 Leadership and stakeholder engagement

As the custodian and principal driver of all HRIS activities, the NDoH should intensify stakeholder engagements with all the relevant stakeholders. It is also imperative to urgently involve the private sector, which employs a significant number of the health workforce. Additionally, integrating health workforce training institutions, such as medical schools into the HRIS discussions is essential, as these institutions provide valuable health workforce production indicators. Moreover, conducting bottom-up consultations with lower administrative levels, such as the province and district authorities, is crucial to assess their unique needs and foster a sense of system ownership. This inclusive approach will alleviate resistance to change and empower these stakeholders to effectively utilise the HRIS.

5.2.2 Invest in capacity building

Capacity building in this case is two-fold. Firstly, the NDoH needs to build its internal capacity to support HRIS adoption. This entails developing a specialised unit within the department to oversee all HRIS activities. This unit needs to be equipped with the right people with necessary skills and expertise in both human resource management and information systems, as well as a strong understanding of the intersectionality between these fields. Capacity building at this level also entails developing the required infrastructure including adequate hardware and software components to sustain the HRIS activities. Secondly, capacity building should focus on providing comprehensive training programs tailored to all the different system users and their unique needs and functions within the health sector. These training programs should emphasise practical, hands-on skills with the HRIS to increase user confidence in operating the system.

5.2.3 Find a secure source of funds

The HRIS program is currently funded by the CDC, however, as with all donor-funded programs, this funding is time-bound. It remains unclear whether the National Department of Health has secured a reliable source of funds to not only maintain the system going forward but also facilitate potential system improvements. Given its importance to health workforce planning, the NDoH should consider prioritising the HRIS on its strategic agenda and allocate the necessary funds to sustain the system. Additionally, in the face of competing priorities, the department could explore

support from the National Treasury or strengthen long-term donor partnerships to ensure HRIS sustainability.

5.2.4 Integrate HRIS into national health policy

To ensure that HRIS remains a priority, despite the inevitable leadership changes, it needs to be embedded into the national core policies and strategic frameworks. This can be achieved by implementing succession planning and knowledge transfer protocols from one administrator to another. This approach will safeguard institutional memory and ensure that new institutional leaders understand the strategic importance of HRIS. Additionally, incorporating HRIS analytics into key performance indicators (KPIs) to ensure its relevance will also solidify its value in the health sector. For instance, KPIs that link HRIS functionality to data-driven decision-making could be developed and integrated throughout the health sector.

5.2.5 Develop standardised data practices

To ensure effective usage of the HRIS post-adoption, the NDoH needs to establish standardised protocols for data management and reporting. This can be achieved by creating uniform data collection standards across the entire health sector in alignment with the national health workforce indicators. In addition, regular data cleaning protocols should be established to ensure data accuracy and validity. Standardised frameworks and templates for data analysis should be produced and disseminated to all system users to support data-driven decision-making. To emphasise the practical impact of HRIS, the system users should be equipped to interpret the generated reports and translate them into actionable strategies for evidence-based HRH planning. Finally, a feedback mechanism should be established to allow all the system users to report challenges or system breakdowns instantly to prevent and address disruptions in HRIS operations.

5.2.6 Integrate the private sector information systems into the HRIS

Although the HRIS is intended to be a national initiative encompassing the entire health sector, the results of this study indicate that the private sector is yet to be integrated into the national HRIS. Efforts to include the private sector must be expedited especially in view of the newly

adopted National Health Insurance policy which will require integrated health workforce planning across both the public and private health care sectors.

5.3 Areas for Future Research

This study involved a relatively small sample size, which limited the range of insights generated. Expanding this research to include a broader and more diverse study population would yield a deeper and more nuanced understanding of the factors influencing HRIS adoption in the South African health sector. Furthermore, it would be beneficial to the health sector if interested scholars and researchers investigated the effectiveness of the national integrated HRIS to determine whether it indeed fulfils its potential in strengthening evidence-based HRH planning

REFERENCES

1. Campbell J, Dussault G, Buchan J, Pozo-Martin F, Guerra AM, Leonne C, et al. A universal truth: no health without a workforce. Forum Report, Third Global Forum on Human Resources for Health [Internet]. WHO Geneva, Switzerland; 2013 p. 1–104. Available from: https://cdn.who.int/media/docs/default-source/health-workforce/ghwn/ghwa/ghwa_auniversaltruthreport.pdf

2. World Health Organization. Global strategy on human resources for health: workforce 2030 [Internet]. Geneva: World Health Organization; 2016 [cited 2024 Oct 20]. 64 p. Available from: https://iris.who.int/handle/10665/250368

3. Lopes MA, Almeida ÁS, Almada-Lobo B. Handling healthcare workforce planning with care: where do we stand? Hum Resour Health [Internet]. 2015 Dec [cited 2024 Oct 20];13(1):38. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-015-0028-0

4. Riley P, Zuber A, Vindigni S, Gupta N, Verani A, Sunderland N, et al. Information systems on human resources for health: A global review. Human resources for health. 2012 Apr 30;10:7.

5. World Health Organization. The Kampala declaration and agenda for global action. Déclaration de Kampala et programme pour une action mondiale [Internet]. 2008 [cited 2024 May 21];22. Available from: https://iris.who.int/handle/10665/43898

6. Global Health Workforce Alliance, WHO, Prince Mahidol Award Conference, JICA. Report on the Prince Mahidol Award Conference 2011, 2nd Global Forum on Human Resources for Health: reviewing progress, renewing commitments to health workers towards MDGs and beyond. [Internet]. Bangkok,Thailand; 2011. Available from: https://www.jica.go.jp/Resource/activities/issues/health/more_kaigi/pdf/GlobalForum2011.pdf

7. Poz MRD, World Health Organization, World Bank, United States, editors. Handbook on monitoring and evaluation of human resources for health: with special applications for low- and middle-income contries. Geneve: World Health Organization; 2009. 178 p.

8. African Union,. Conclusions and Recommendations from the High Level Inter-ministerial Technical Consultation on Strengthening Political Support for Health Worker Development in Africa. Document_Centre/recommend_gaborone_english_03_07 pdf [accessed 2015-06-30][WebCite Cache ID 6clgnoyOQ] [Internet]. 2007; Available from: https://healthresearchwebafrica.org.za/files/AFRICA_HEALTH_STRATEGY_FINAL.pdf

9. World Health Organization. Human resources for health information system: minimum data set for health workforce registry [Internet]. World Health Organization; 2015. Available from: https://iris.who.int/bitstream/handle/10665/330091/9789241549226-eng.pdf

10. Dilu E, Gebreslassie M, Kebede M. Human Resource Information System implementation readiness in the Ethiopian health sector: a cross-sectional study. Hum Resour Health

[Internet]. 2017 Dec [cited 2023 Mar 6];15(1):85. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0259-3

11. National Department of Health. 2030 human resources for health strategy: Investing in the health workforce for universal health coverage. Government printers Pretoria; 2020.

12. Eastern Cape Provincial Treasury. PERSAL POLICY [Internet]. Available from: https://www.ectreasury.gov.za/modules/content/files/Documents/Policies%20and%20Guidelines/Policies%20and%20Guidelines/2014/HRS/Human%20Resource%20Services%20-%20PERSAL%20Policy.pdf

13. Mathews V. Monitoring and evaluation workstream report. Unpublished technical report. 2019.

14. Unisa Counselling and Career Development. Professional bodies in South Africa [Internet]. 2018. Available from: https://www.unisa.ac.za/static/corporate_web/Content/About/Service%20departments/DCCD/Documents/career_professionalbodies_unisa.pdf

15. Nicol E. District Health Information System (DHIS): Rapid Information Needs Assessment. 2012. 2012.

16. National Department of Health R of SA. Internship and Community Service Programme [Internet]. 2023 [cited 2023 Mar 5]. Available from: https://icsp2020.dhis.dhmis.org/

17. B.H.F. Board of Healthcare Funders - BHF [Internet]. 2023 [cited 2023 Mar 4]. Available from: https://bhfglobal.com/

18. Board of Healthcare Funders. Our Vision - BHF [Internet]. 2018 [cited 2023 Mar 4]. Available from: https://bhfglobal.com/about-us/our-vision/

19. CMSA. The Colleges of Medicine of South Africa: Home Page [Internet]. 2023 [cited 2023 Mar 5]. Available from: https://www.cmsa.co.za/Default.aspx

20. Torab-Miandoab A, Samad-Soltani T, Jodati A, Rezaei-Hachesu P. Interoperability of heterogeneous health information systems: a systematic literature review. BMC Med Inform Decis Mak [Internet]. 2023 Jan 24 [cited 2024 Sep 30];23(1):18. Available from: https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/s12911-023-02115-5

21. Health Information Systems Program South Africa (HISP) | Devex [Internet]. [cited 2024 Sep 30]. Available from: https://www.devex.com/organizations/health-information-systems-program-south-africa-hisp-121499

22. Department of Health, Republic of South Africa. A National Human Resource Plan for Health [Internet]. Government Printers; 2006. Available from: https://www.equinetafrica.org/sites/default/files/uploads/documents/SOUhres_200307.pdf

23. Matsoso MP, Strachan B. Human Resources for Health for South Africa : HRH Strategy for the Health Sector 2012/13 - 2016/17. South African Health Review [Internet]. 2011;2011:49–58. Available from: https://api.semanticscholar.org/CorpusID:70540355

24. National Department of Health. Presidential Health Summit Report [Internet]. 2018. Available from: https://www.gov.za/sites/default/files/gcis_document/201902/presidential-health-summit-report.pdf

25. Presidential Health Summit Report.pdf [Internet]. [cited 2024 Mar 25]. Available from: https://www.gov.za/sites/default/files/gcis_document/201902/presidential-health-summit-report.pdf

26. World Health Organization. National health workforce accounts: a handbook [Internet]. Geneva: World Health Organization; 2017 [cited 2024 Oct 2]. 153 p. Available from: https://iris.who.int/handle/10665/259360

27. DeSanctis G. Human Resource Information Systems: A Current Assessment. MIS Quarterly [Internet]. 1986 Mar [cited 2023 Jun 6];10(1):15. Available from: https://www.jstor.org/stable/248875?origin=crossref

28. Tannenbaum SI. Human Resource Information Systems: User Group Implications. Journal of Systems Management [Internet]. 1990 Jan;41(1):27. Available from: https://www.proquest.com/scholarly-journals/human-resource-information-systems-user-group/docview/199812686/se-2?accountid=15083

29. Hendrickson AR. Human resource information systems: Backbone technology of contemporary human resources. J Labor Res [Internet]. 2003 Sep [cited 2024 Oct 14];24(3):381–94. Available from: http://link.springer.com/10.1007/s12122-003-1002-5

30. Ruël H, Magalhães R, Chiemeke CC. Human resource information systems: An integrated research agenda. In: Electronic HRM in theory and practice. Emerald Group Publishing Limited; 2011. p. 21–39.

31. Menant L, Gilibert D, Sauvezon C. The application of acceptance models to human resource information systems: a literature review. Frontiers in Psychology. 2021;12:659421.

32. World Health Organization. Strengthening the collection, analysis and use of health workforce data and information: a handbook. [Internet]. Geneva; 2022. Available from: https://iris.who.int/bitstream/handle/10665/365680/9789240058712-eng.pdf?sequence=1&isAllowed=y

33. Davis F. User acceptance of Information Systems: The Technology Acceptance Model (TAM). Michigan; 1987.

34. Göktaş P, Akgül Y. The investigation of employer adoption of human resource information systems at University using TAM. In: Research Anthology on Human Resource Practices for the Modern Workforce. IGI Global; 2022. p. 1094–121.

35. Malatji WR, Eck RV, Zuva T. Understanding the usage, Modifications, Limitations and Criticisms of Technology Acceptance Model (TAM). Adv sci technol eng syst j [Internet]. 2020 [cited 2024 Oct 15];5(6):113–7. Available from: https://astesj.com/v05/i06/p12/

36. Venkatesh, Morris, Davis, Davis. User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly [Internet]. 2003 [cited 2024 May 31];27(3):425. Available from: https://www.jstor.org/stable/10.2307/30036540

37. Williams MD, Rana NP, Dwivedi YK. The unified theory of acceptance and use of technology (UTAUT): a literature review. Journal of enterprise information management. 2015;28(3):443–88.

38. Abosede OE. Diffusion of Innovation Theory: An Effective Approach to Accelerate Adoption of Information and Communication Technology in Twenty-First Century Knowledge Society. ijird [Internet]. 2020 Apr 30 [cited 2024 May 31];9(4). Available from: http://www.internationaljournalcorner.com/index.php/ijird_ojs/article/view/152423

39. Tornatzky LG, Eveland JD, Fleischer M. Technological innovation as a process. The processes of technological innovation. 1990;27–50.

40. Baker J. The Technology–Organization–Environment Framework. In: Dwivedi YK, Wade MR, Schneberger SL, editors. Information Systems Theory [Internet]. New York, NY: Springer New York; 2012 [cited 2024 Oct 15]. p. 231–45. (Integrated Series in Information Systems; vol. 28). Available from: https://link.springer.com/10.1007/978-1-4419-6108-2_12

41. Yusof MM, Kuljis J, Papazafeiropoulou A, Stergioulas LK. An evaluation framework for Health Information Systems: human, organization and technology-fit factors (HOT-fit). International journal of medical informatics. 2008;77(6):386–98.

42. Alam MGR, Masum AKM, Beh LS, Hong CS. Critical Factors Influencing Decision to Adopt Human Resource Information System (HRIS) in Hospitals. Deng Y, editor. PLoS ONE [Internet]. 2016 Aug 5 [cited 2023 Mar 7];11(8):e0160366. Available from: https://dx.plos.org/10.1371/journal.pone.0160366

43. Sumantri H, Tukiran M, Hannan S. Using Technology Acceptance Model (TAM Model) to Increase Effectiveness the Use of Human Resource Information System (HRIS): Empirical Studies at a Private Company in Indonesia. JM-UIKA [Internet]. 2023 Oct 5 [cited 2024 Oct 15];14(3):344–63. Available from: https://ejournal.uika-bogor.ac.id/index.php/manajemen/article/view/14492

44. Ifinedo P. Technology acceptance by health professionals in Canada: An analysis with a modified UTAUT model. In IEEE; 2012. p. 2937–46.

45. Alkhwaldi AF, Alobidyeen B, Abdulmuhsin AA, Al-Okaily M. Investigating the antecedents of HRIS adoption in public sector organizations: integration of UTAUT and TTF. International Journal of Organizational Analysis. 2023;31(7):3251–74.

46. Deharja A, Santi MW, Damayanti NA, Hargono A, Nandini N. Evaluating the usability of hospital information system (HIS) through human organization technology-fit (Hot-Fit) model. International Proceedings The 2nd ISMoHIM 2020. 2020;

47. Imron MIR, Hidayanto AN, Fitriani WR, Nugroho WS, Inan DI. Analysis of cloud-based human resource information system adoption factors prioritization in micro, small, and medium enterprises. In IEEE; 2019. p. 295–300.

48. Anitha J, Aruna M. Adoption of Human Resource Information System in Organisations. Journal of Contemporary Research in Management. 2014;9(4).

49. Ibrahim AM, Ali H. Factors Affecting Human Resource Information System: IT Infrastructure, Management Support, and Market Competition. Dinasti International Journal of Management Science. 2023;5(1):136–41.

50. Troshani I, Jerram C, Rao Hill S. Exploring the public sector adoption of HRIS. Industrial Management & Data Systems [Internet]. 2011 Jan 1 [cited 2024 May 31];111(3):470–88. Available from: https://doi.org/10.1108/02635571111118314

51. Al-Dmour RH, Love S, Al-Zu'bi Z. Factors influencing the adoption of HRIS applications: a literature review. International Journal of Management & Business Studies. 2013;3(4):9–26.

52. Rahman MA, Qi X, Jinnah MS. Factors affecting the adoption of HRIS by the Bangladeshi banking and financial sector. Liu S, editor. Cogent Business & Management [Internet]. 2016 Dec 31 [cited 2024 Oct 17];3(1):1262107. Available from: https://www.tandfonline.com/doi/full/10.1080/23311975.2016.1262107

53. Warui C, Mukulu E, Karanja K. The Influence of Management Participation on Adoption of HRIS IN Teachers Service Commission (TSC) Operations in Kenya. IJARBSS [Internet]. 2015 Feb 15 [cited 2024 Jun 3];5(2):Pages 46-60. Available from: http://hrmars.com/index.php/journals/papers/IJARBSS/v5-i2/1462

54. Ahmer Z. Adoption of human resource information systems innovation in Pakistani organizations. Journal of Quality and Technology Management. 2013;9(2):22–50.

55. Waters K, Mazivila M, Dgedge M, Necochea E, Manharlal D, Zuber A, et al. eSIP-Saúde: Mozambique's novel approach for a sustainable human resources for health information system. Human Resources for Health. 2016 Nov 5;14.

56. Ishijima H, Mapunda M, Mndeme M, Sukums F, Mlay VS. Challenges and opportunities for effective adoption of HRH information systems in developing countries: national rollout of HRHIS and TIIS in Tanzania. Hum Resour Health [Internet]. 2015 Dec [cited 2023 Mar 7];13(1):48. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-015-0043-1

57. Chabani Z. The challenges facing public organizations to implement human resources information systems: a case study of Algeria. Journal of Management Information and Decision Sciences. 2020;23(4):230–44.

58. Matimbwa H, Masue OS. Usage and challenges of human resources information system in the Tanzanian public organizations. Journal of Human Resource Management. 2019;7(4):131–7.

59. Al-Dmour RH, Zu'bi M. Factors Motivating and Inhibiting the Practice of HRIS in Business Organizations: An Empirical Analysis. International Business Research. 2014;7(7):139.

60. Mirza M, Grant-Greene Y, Valles MPJS, Joseph P, Juin S, Brice S, et al. Leveraging PEPFAR-Supported Health Information Systems for COVID-19 Pandemic Response. Emerg Infect Dis [Internet]. 2022 Oct [cited 2024 Oct 17];28(13). Available from: https://wwwnc.cdc.gov/eid/article/28/13/22-0751_article.htm

61. Ledikwe JH, Reason LL, Burnett SM, Busang L, Bodika S, Lebelonyane R, et al. Establishing a health information workforce: innovation for low- and middle-income countries. Hum Resour Health [Internet]. 2013 Dec [cited 2023 Mar 7];11(1):35. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/1478-4491-11-35

62. Were V, Jere E, Lanyo K, Mburu G, Kiriinya R, Waudo A, et al. Success of a South-South collaboration on Human Resources Information Systems (HRIS) in health: a case of Kenya and Zambia HRIS collaboration. Hum Resour Health [Internet]. 2019 Dec [cited 2023 Mar 7];17(1):6. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-019-0342-z

63. Spero JC, McQuide PA, Matte R. Tracking and monitoring the health workforce: a new human resources information system (HRIS) in Uganda. Hum Resour Health [Internet]. 2011 Dec [cited 2023 Mar 7];9(1):6. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/1478-4491-9-6

64. PEPFAR. PEPFAR 2023 Country and Regional Operational Plan (COP/ROP) Guidance for all PEPFAR-Supported Countries [Internet]. 2023. Available from: https://www.state.gov/wp-content/uploads/2023/02/PEPFAR-2023-Country-and-Regional-Operational-Plan.pdf

65. McQuide P, Settle D, Abubaker W, Alsheikh GM, C. R, de Vries D. Use of administrative data sources for health workforce analysis: multicountry experience in implementation of human resources information systems. In 2009. p. 113–27.

66. Chibuzor M, Arikpo I, Aquaisua E, Esu E, Okoroafor SC, Omar S, et al. Implementation of health workforce information systems: a review of eight sub-Saharan country experiences. Journal of Public Health [Internet]. 2021 Apr 13 [cited 2024 Oct 28];43(Supplement_1):i27–40. Available from: https://academic.oup.com/jpubhealth/article/43/Supplement_1/i27/6224841

67. De Vries D, Settle D, McQuide PA. The Impact of Human Resources Information Systems (HRIS) Strengthening [Internet]. Available from: https://www.intrahealth.org/sites/default/files/attachment-files/legacyseries_6.pdf

68. Forman C, Goldfarb A, Greenstein S. Technology Adoption. In: Augier M, Teece DJ, editors. The Palgrave Encyclopedia of Strategic Management [Internet]. London: Palgrave

Macmillan UK; 2018 [cited 2023 Mar 7]. p. 1719–23. Available from: http://link.springer.com/10.1057/978-1-137-00772-8_379

69. Markova G. Building dynamic capabilities: the case of HRIS. Management Research: Journal of the Iberoamerican Academy of Management [Internet]. 2012 Aug 10 [cited 2025 Mar 3];10(2):81–98. Available from: https://www.emerald.com/insight/content/doi/10.1108/1536-541211251580/full/html

70. Albouti A, Balaji D. Use and challenges of HRIS in public organizations; a study based on developing country. GRADIVA review journal. 2022;8.

71. McQuide PA, Brown AN, Diallo K, Siyam A. The transition of human resources for health information systems from the MDGs into the SDGs and the post-pandemic era: reviewing the evidence from 2000 to 2022. Hum Resour Health [Internet]. 2023 Dec 1 [cited 2024 Jun 10];21(1):93. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-023-00880-y

72. Vital Wave, IntraHealth International,, Cooper/Smith. Human Resources for Health: Workforce Analytics for Design and Planning Report [Internet]. 2021. Available from: https://vitalwave.com/wp-content/uploads/2021/06/HRH-Assessment_Final-Report-2021.pdf

73. Ivanaj S. HRIS adoption in organizations: A meta-analytic test of competing theoretical models. @GRH [Internet]. 2023;46(1):95–131. Available from: https://www.cairn.info/revue-agrh1-2023-1-page-95.htm

74. Seif JK. Challenges of Adopting Human Resource Information Systems in the Information Technology Industry in Kenya: A Survey Of Selected It Firms. 2015;

75. Mahlathi P, Dlamini J. Minimum data sets for human resources for health and the surgical workforce in South Africa's health system. A rapid analysis of stock and migration: Africa Institute for Health and Leadership Development [Internet]. 2015. Available from: https://www.prographic.com/wp-content/uploads/2016/07/0316-south-africa-case-studies-web.pdf

76. Kumar R, Shaikh BT, Ahmed J, Khan Z, Mursalin S, Memon MI, et al. The human resource information system: a rapid appraisal of Pakistan's capacity to employ the tool. BMC Med Inform Decis Mak [Internet]. 2013 Dec [cited 2024 Oct 17];13(1):104. Available from: https://bmcmedinformdecismak.biomedcentral.com/articles/10.1186/1472-6947-13-104

77. Bagyendera M, Nabende P, Nabukenya J. Critical factors influencing data use and utilization in health systems: a focus on data and interoperability standards for health information exchange (HIE) in Uganda's health care system. Oxford Open Digital Health [Internet]. 2023 Jan 1 [cited 2024 Oct 17];1:oqad015. Available from: https://academic.oup.com/oodh/article/doi/10.1093/oodh/oqad015/7277358

78. Chakraborty AR, Mansor NNA. Adoption of Human Resource Information System: A Theoretical Analysis. Procedia - Social and Behavioral Sciences [Internet]. 2013 Apr [cited 2023 Mar 6];75:473–8. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1877042813005879

79. Udekwe E, Iwu CG, Obadire OS. Impact of Human Resource Information System Performance for Sustainable Health Sector in South Africa. EJKM [Internet]. 2024 Apr 24 [cited 2024 Oct 17];22(2):01–17. Available from: https://academic-publishing.org/index.php/ejkm/article/view/3344

80. National Department of Health. NATIONAL HEALTH INSURANCE FOR SOUTH AFRICA. 2017.

81. Stebbins R. Exploratory research in the social sciences: what is exploration? Exploratory Research in the Social Sciences. 2001 Jan 1;2–18.

82. Health | South African Government [Internet]. [cited 2024 May 8]. Available from: https://www.gov.za/about-sa/health

83. Department Details - Gauteng Provincial Government | Visit Us Online [Internet]. [cited 2024 May 8]. Available from: https://www.gauteng.gov.za/Departments/DepartmentDetails/CPM-001006

84. HISP-SA. HISP-SA. 2023 [cited 2023 Mar 1]. https://www.hisp.org/. Available from: https://www.hisp.org/

85. SANC – Regulating Nursing [Internet]. [cited 2024 May 8]. Available from: https://www.sanc.co.za/

86. Blechynden,Daniel. Otter review [Internet]. 2020. Available from: https://www.techradar.com/reviews/otter-review.

87. Braun V, Clarke V. Thematic analysis. In 2012. p. 57–71.

88. Lincoln YS, Guba EG, Pilotta JJ. Naturalistic inquiry. International Journal of Intercultural Relations [Internet]. 1985 Jan [cited 2024 Jul 9];9(4):438–9. Available from: https://linkinghub.elsevier.com/retrieve/pii/0147176785900628

89. Korstjens I, Moser A. Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. European Journal of General Practice [Internet]. 2018 Jan 1 [cited 2024 Jul 9];24(1):120–4. Available from: https://www.tandfonline.com/doi/full/10.1080/13814788.2017.1375092

90. Anney VN. Ensuring the quality of the findings of qualitative research: Looking at trustworthiness criteria. 2014;

91. Kakar ZUH, Rasheed R, Rashid A, Akhter S. Criteria for assessing and ensuring the trustworthiness in qualitative research. IJBR [Internet]. 2023 Dec 31 [cited 2024 Jul 10];4(2):150–73. Available from: http://journals.pu.edu.pk/journals/index.php/ijbr/article/view/7358

92. Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. Education for information. 2004;22(2):63–75.

93. Jamieson MK, Govaart GH, Pownall M. Reflexivity in quantitative research: A rationale and beginner's guide. Social & Personality Psych [Internet]. 2023 Apr [cited 2024 Oct 21];17(4):e12735. Available from: https://compass.onlinelibrary.wiley.com/doi/10.1111/spc3.12735

94. Khanyile V. Human Resources Information System (HRIS) Overview. PowerPoint presentation presented at; 2023 May 17; Wits School of Public Health.

95. Kumpf B, Proud E. The Adoption of Innovation. 2022; Available from: https://ssir.org/articles/entry/the_adoption_of_innovation

96. Dal Poz MR, Gupta N, Quain E. Handbook on Monitoring and Evaluation of Human Resources for Health: With Special Applications for Low- and Middle-income Countries. Geneva: World Health Organization; 2009. 195 p.

97. Waters KP, Zuber A, Willy RM, Kiriinya RN, Waudo AN, Oluoch T, et al. Kenya's Health Workforce Information System: A model of impact on strategic human resources policy, planning and management. International Journal of Medical Informatics [Internet]. 2013 Sep [cited 2023 Mar 6];82(9):895–902. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1386505613001329

98. Spero JC, McQuide PA, Matte R. Tracking and monitoring the health workforce: a new human resources information system (HRIS) in Uganda. Human Resources for Health [Internet]. 2011 Feb 17;9(1):6. Available from: https://doi.org/10.1186/1478-4491-9-6

99. Laukka E, Huhtakangas M, Heponiemi T, Kanste O. Identifying the Roles of Healthcare Leaders in HIT Implementation: A Scoping Review of the Quantitative and Qualitative Evidence. IJERPH [Internet]. 2020 Apr 21 [cited 2024 Oct 28];17(8):2865. Available from: https://www.mdpi.com/1660-4601/17/8/2865

100. Tursunbayeva A. Human resource information systems in healthcare : processes of development, implementation and benefits realization in complex organizations [Internet]. Milano: Franco Angeli; 2018. (Economia. Ricerche ; 1175). Available from: http://digital.casalini.it/9788891773968

101. Schurmann A, Gatt L, Smith B, Arakelian M, McQuide P, Colins A, et al. Human Resources for Health: Workforce Analytics for Design and Planning Report. 2021.

102. Naveed S, Suhail A, Rana NS. Adoption of hris in the public organizations: institutional logics perspective. Pakistan Journal of Information Management and Libraries. 2021;23:1–27.

103. Driessen J, Settle D, Potenziani D, Tulenko K, Kabocho T, Wadembere I. Understanding and valuing the broader health system benefits of Uganda's national Human Resources for Health Information System investment. Human Resources for Health [Internet]. 2015 Aug 31;13(1):49. Available from: https://doi.org/10.1186/s12960-015-0036-0

104. Tursunbayeva A, Bunduchi R, Pagliari C. "Planned Benefits" Can Be Misleading in Digital Transformation Projects: Insights From a Case Study of Human Resource

Information Systems Implementation in Healthcare. Sage Open [Internet]. 2020 Apr [cited 2024 Oct 28];10(2):2158244020933881. Available from: https://journals.sagepub.com/doi/10.1177/2158244020933881

105. Driessen J, Settle D, Potenziani D, Tulenko K, Kabocho T, Wadembere I. Understanding and valuing the broader health system benefits of Uganda's national Human Resources for Health Information System investment. Hum Resour Health [Internet]. 2015 Dec [cited 2023 Mar 7];13(1):49. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-015-0036-0

106. Health Sector overview; Fifth Parliament Legacy Report | PMG [Internet]. [cited 2024 Oct 28]. Available from: https://pmg.org.za/committee-meeting/28778/

107. Tursunbayeva A, Bunduchi R, Franco M, Pagliari C. What Kind of Benefits Different Stakeholders Can Expect and Obtain from HRIS Implementations: An Italian Case Study. In: Lazazzara A, Nacamulli RCD, Rossignoli C, Za S, editors. Organizing for Digital Innovation. Cham: Springer International Publishing; 2019. p. 39–48.

108. Waters KP, Zuber A, Simbini T, Bangani Z, Krishnamurthy RS. Zimbabwe's Human Resources for health Information System (ZHRIS)—an assessment in the context of establishing a global standard. International Journal of Medical Informatics [Internet]. 2017 Apr [cited 2023 Mar 6];100:121–8. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1386505617300114

109. Bhattacharyya DS, Shafique S, Akhter S, Rahman A, Islam MZ, Rahman N, et al. Challenges and facilitators of implementation of an information communication and technology (ICT)-based human resources management tool in the government health sector in Bangladesh: protocol for an exploratory qualitative research study. BMJ Open [Internet]. 2020 Dec 1;10(12):e043939. Available from: http://bmjopen.bmj.com/content/10/12/e043939.abstract

110. Kumar R, Shaikh BT, Ahmed J, Khan Z, Mursalin S, Memon MI, et al. The human resource information system: a rapid appraisal of Pakistan's capacity to employ the tool. BMC Medical Informatics and Decision Making [Internet]. 2013 Sep 10;13(1):104. Available from: https://doi.org/10.1186/1472-6947-13-104

111. The Local Government and Health Consortium. Decentralising health services in South Africa: Constraints and Opportunities [Internet]. Durban: Health Systems Trust,; 2004 Apr. Available from: https://researchonline.lshtm.ac.uk/id/eprint/13117/1/Decentralising%20Health%20Services%20in%20South%20AfricaConstraints%20and%20Opportunities.pdf

112. Chabani Z. The challenges facing public organizations to implement human resources information systems: a case study of Algeria. Journal of Management Information and Decision Sciences. 2020;23(4):230–44.

113. Dieleman JL, Haakenstad A. The complexity of resource allocation for health. The Lancet Global Health [Internet]. 2015 Jan 1 [cited 2024 Oct 31];3(1):e8–9. Available from: https://doi.org/10.1016/S2214-109X(14)70373-0

114. Matimbwa H, Masue OS. Usage and challenges of human resources information system in the Tanzanian public organizations. Journal of Human Resource Management. 2019;7(4):131–7.

115. Masum AKM, Abid FB, Arafat AY, Beh LS. Factors Influencing Practice of Human Resource Information System in Organizations: A Hybrid Approach of AHP and DEMATEL. International Journal of Advanced Computer Science and Applications. 2020;11(6):700–6.

APPENDICES

Appendix 1: Plagiarism Declaration form



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Megan Rwigamba (Student number: 1494901) am a student registered

for the degree of Master of Public Health in the academic year 2025.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: _____ Date: 26th February 2025

Appendix 2: Turnitin Report

turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Megan Rwigamba
Assignment title:	Draft submission (all, regardless of course/programme) Final
Submission title:	report Megan 25th Feb 2025-1.docx
File name:	Final_report_Megan_25th_Feb_2025.docx
File size:	666.13K
Page count:	90
Word count:	25,796
Character count:	153,490
Submission date:	11-Mar-2025 12:22PM (UTC+0200)
Submission ID:	2611601585

Document Viewer

Turnitin Originality Report

Processed on: 11-Mar-2025 12:24 PM SAST

ID: 2611601585

Word Count: 25796

Submitted: 1

Final report Megan 25th Feb 2025-1.docx By Megan Rwigamba

Similarity Index	Similarity by Source	
12%	Internet Sources:	10%
	Publications:	11%
	Student Papers:	N/A

include quoted | include bibliography | excluding matches < 8 words | mode: quickview (classic) report | print | download

1% match (Internet from 02-Oct-2022)
https://wiredspace.wits.ac.za/bitstream/handle/10539/29852/Analysing%20approved%20incapacity%20leave%20among%20health%20professionals%20in%20the%20Gauteng%20Departm
isAllowed=y&sequence=1

1% match (Internet from 28-Oct-2023)
https://etd.cput.ac.za/bitstream/20.500.11838/3670/1/Udekwe_Emmanuel_204186951.pdf

<1% match (Internet from 08-May-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/c79bd0ac-a774-48d6-a304-95251ba195bb/content

<1% match (Internet from 05-May-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/2d309353-eb11-475f-805f-4eebe7d6765b/content

<1% match (Internet from 25-Nov-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/d69917e4-8823-4d20-bc1c-c6838ac97a87/content

<1% match (Internet from 16-Jan-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/f4c887c3-a7bd-442f-804b-66f02361c024/content

<1% match (Internet from 04-Oct-2023)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/299fe5ef-4e95-4620-a00b-e6e0d26014be/content

<1% match (Internet from 01-Jun-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/6f838985-9b6f-44f5-bf63-6c4ed3012bbe/content

<1% match (Internet from 08-May-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/b2e139ff-4e6f-44cd-b1ec-bf6f5733515d/content

<1% match (Internet from 09-May-2024)
https://wiredspace.wits.ac.za/server/api/core/bitstreams/eb726e5a-773e-436c-a8d6-fa1e86d7fb6e/content

Appendix 3: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Miss Megan Rwigamba et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M210744

NAME: (Principal Investigator)	Miss Megan Rwigamba et al
DEPARTMENT:	School of Public Health
PROJECT TITLE:	Factors influencing the adoption of a national integrated human resource information system in the South African health sector
DATE CONSIDERED:	30/07/2021
DECISION:	Approved conditionally
CONDITIONS:	Provide written permissions from the relevant authorities of the study sites to HREC (Medical) before data collection commences
SUPERVISOR:	Dr Prudence Ditlopo
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	20/10/2021

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions.Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **July** and will therefore be due in the month of **July** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 4: Participant information sheet

PARTICIPANT INFORMATION SHEET

Study title: Factors influencing the adoption of a national integrated Human Resource Information System in the South African Health Sector.

Good day Sir/Madam.

Introduction:

My name is Megan Rwigamba, I am a Master of Public Health student from the School of Public Health at the University of the Witwatersrand in Johannesburg. I am conducting research that seeks to explore the factors influencing the adoption of a national integrated Human Resource Information system (HRIS) in the health sector. In this study we want to understand the facilitators and barriers influencing the adoption of a national HRIS.

I am kindly asking / inviting you to take part in this research study.

What is involved in the study?

This study will mainly be conducted through interviews, preferably face-to-face, however virtual video or audio recorded interviews will also be considered in the event that face-to-face interviews are not possible. The interviews will take approximately one hour to complete.

Risks of being involved in the study:

Please note that participation in this study is voluntary therefore, there will be no negative consequences for individuals who do not want to be interviewed. During the interview, you have the right to decline to answer any questions that make you feel uncomfortable or to stop the interview at any time. However, I would appreciate it if you do share your thoughts and feelings about the questions I will be asking you.

Benefits of being in the study:

Please note that participation is this study is voluntary and there will be no direct benefits or rewards for anyone who participates in the study. However the results of this study could benefit policy makers in providing them with evidence of the factors that they need to consider in order to adopt a national integrated Human Resource Information System.

Participation is voluntary, that refusal to participate will involve no penalty or loss of benefits to which the Participant is otherwise entitled.
Reimbursements for "out of pocket" expenses. The participants will not incur any expenses therefore there will be no need for reimbursements

Confidentiality:
The information that you give in the interview will be kept confidential. Only the research team which is made up of my supervisors and me will have access to the interviews. All interviewees will be assigned a code and these codes will be used on the transcribed interviews. Your name will not be revealed in any written data or report resulting from the study. The answers given by participants will be combined and analyzed to look for common themes and experiences. The combined information will be written up as part of my final research report.

Anonymity:
To ensure anonymity, pseudonyms will be assigned to each interviewee.

Data Storage:
To ensure protection of the study participants' personal information, pseudonyms will be assigned to each interviewee and therefore only de-identified data will be stored on the researcher's cloud storage. All the devices and equipment that will be used during data collection such as an external hard drive and computer, as well as the transcripts and digital recordings will be stored in a strictly access controlled room which will only be designated to the principal researcher. Data will only be shared with the research supervisors who are appointed to this study by the WITS school of Public Health.

All the data in form of transcripts and recorded interviews, will be securely retained for two (2) years, if a scientific publication arises from the study and six (6) years, if there is no publication. Thereafter it will be destroyed accordingly in accordance to the WITS ethics guidelines.

Contact details of researcher/s:

Should require more information on the study, please contact me or my supervisors on the contact details below.

MPH candidate	**Supervisor**	**Co-Supervisor**
Megan Rwigamba Cell: 0604933171 Email: **rwigambamegan@gmail.com**	**Dr. Prudence Ditlopo** Centre for Health Policy School of Public Health University of the Witwatersrand Johannesburg Phone: 011-717 3433 Email: **prudence.ditlopo@wits.ac.za**	**Dr. Verona Mathews** School of Public Health University of the Western Cape Cape Town Phone: +27832582802 Email: **vmathews@uwc.ac.za**

Outputs:

The results of this study will be compiled into a research report which will be shared with all the participants after the study is completed.

Contact details of HREC administrator and chair:

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg. A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research. If you have any concern over the way the study is being conducted, please contact the Chairperson of **Clement.Penny@wits.ac.za.** The telephone numbers for the Committee secretariat are **0117172700/123** and the e-mail addresses are **zanele.ndlovu@wits.ac.za** and **Rhulani.Mukansi@wits.ac.za**.

Appendix 5: Participant consent forms

PARTICIPANT CONSENT FORM PART 1

Title: Factors influencing the adoption of a national integrated Human Resource Information System in the South African Health Sector.

I agree to participate in the study entitled: **Factors influencing the adoption of a national integrated Human Resource Information System in the South African health sector.**

The goals, methods, and purpose of the study have been explained to me, and I have been allowed to ask questions. I understand that the study will involve participating in an in-depth interview. I understand that I have the right to refuse participation at any time in the study.

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study, which is attached hereto;
2. I was given time to read it, or had it read to me, in the language I best understand;
3. I was given time to ask any questions I wanted to and found any answers given to me to be reasonable and satisfactory;
4. I believe I fully understand why the study is being conducted and what the intended outcomes will be;
5. I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time;
6. I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about me for the purposes of the study would immediately be destroyed, unless I give consent for it to be retained;
7. I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study I am free to speak to any of these contacts.

Contact details:

Megan Rwigamba, **Principal Investigator**, telephone no. **0604933171**, or by e-mail at **rwigambamegan@gmail.com**.
Dr. Prudence Ditlopo, **Supervisor**, on telephone no: **082 925 1591** or by e-mail at **prudence.ditlopo@wits.ac.za**
Dr. Verona Mathews**, Co-supervisor,** on telephone no: **0832582802** or by email at **vmathews@uwc.ac.za.**
Professor CB Penny, **Chairperson of the Human Research Ethics Committee (Medical)** at the University of Witwatersrand, on telephone no. **011 717 2301**, or by e-mail at **Clement.Penny@wits.ac.za**.
Ms. Z Ndlovu or Mr Rhulani Mkansi, **Committee Secretariat**, telephone nos.: **011 717 2700** or **1234**, or by e-mail at: **zanele.ndlovu@wits.ac.za** or **Rhulani.Mukansi@wits.ac.za**

Name of Participant: _____
Date: _____
Place: _____
Signature or mark _____

Witnessed by:
Name of Witness: _____
Signature: _____
Date: _____

APPENDIX 5B: CONSENT FORM FOR AUDIO-RECORDING

Title: Factors influencing the adoption of a national integrated Human Resource Information System in the South African Health Sector.

I hereby consent to audio recording of the interview.

.

I understand that:

- The recording will be stored in a secure location (a locked cupboard or password protected computer) with restricted access to the researcher and the research supervisor;
- The recording will be transcribed and any information that could identify me will be removed;
- The recordings will be erased within either (a) two (2) years of the publication of the research findings, or (b) six (6) years, if no publications arise from this research;
- Anyone wishing to access this information in the future will first have to obtain the approval of the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg;
- Direct quotes from my interview, without any information that could identify me, may be cited in the research report or other write-ups of research.

Name of Participant: _____
Date: _____
Place: _____
Signature or mark _____

Witnessed by:

Name of Witness: _____
Signature: _____
Date: _____

APPENDIX 5C; CONSENT FORM FOR VISUAL RECORDING OF STUDY PARTICIPATION

Title; Factors influencing the adoption of a national integrated Human Resource Information System in the South African Health Sector.

I hereby consent to visual recording of the interview.

I understand that:

- The recording will be stored in a secure location (a locked cupboard or password protected computer) with restricted access to the researcher and the research supervisor.
- The recording will be transcribed and any information that could identify me will be removed
- My face and voice will not be identifiable in any visual recording
- The recordings will normally be erased within either (a) two (2) years of the publication of the research findings, or (b) six (6) years, if no publications arise from this research, or:
- The film, with all identifying information directly linked to me removed, will be stored permanently and may be used for future research
- Anyone wishing to ;8access this information in the future will first have to obtain the approval of the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg
- Direct quotes from my interview, without any information that could identify me, may be cited in the research report or other write-ups of research.

Name of Participant: _____
Date: _____
Place: _____
Signature or mark _____

Witnessed by:
Name of Witness: _____
Signature: _____
Date: _____

APPENDIX 6: Interview Guides

Interview Guide 1: For National Department of Health

FACTORS INFLUENCING THE ADOPTION OF A NATIONAL INTEGRATED HUMANRESOURCE INFORMATION SYSTEM IN THE SOUTH AFRICAN HEALTH SECTOR

PART 1: Interviewee Information

a) Participant ID:

b) Date of interview:

c) Biodata
- Gender
- Age
- Organisation/Department

PART 2: GENERAL

1. What is your current job title and responsibility?

Probes:

a. How long have you been working within your current position?

b. In the duration of your employment with the department of health, have you been involved in any HRIS related work?

2. Since 2006, the HRH Strategies have been advocating for a national integrated human resource information system.

Probes:

a. Are you aware of the plans by the National Department of health to adopt a national integrated HRIS?
b. What has been the main impetus of the plans to adopt a national integrated HRIS?
c. Could you comment on what progress has been made towards the adoption of a national integrated human resource information system?
d. In your opinion, what have been the challenges that have led to this goal not being achieved to date?
e. What do you think are some of the factors that could facilitate HRIS adoption?
f. What do you think are some of the factors that could hinder HRIS adoption?

PART 3: HUMAN FACTORS

3. How do you think the national integrated HRIS will affect your current role within the department?
4. In your opinion, how do you think the adoption of an integrated HRIS will affect the functions of your department?

PART 4: TECHNOLOGICAL FACTORS

5. In your opinion, how will the planned national integrated HRIS operate with the existing information systems (e.g. PERSAL and statutory body registries)?

Probes:

a. How will the new integrated HRIS be compatible with the existing information systems such as PERSAL?
b. What are the procedures for data sharing and linkages between the various information systems and data sources?

6. In your opinion, what technological infrastructure is required to enable the success of a national integrated HRIS?

Probes:

a. What tools, systems, equipment are required?
b. Availability of the tools, systems and equipment required?

7. From a technological point of view, what could hinder the adoption of a national HRIS?

PART 3: ORGANIZATION FACTORS

8. How is HRIS currently managed in your department?

Probes:

a. Are there any people or person within your department mandated with HRIS adoption? If yes, are apart of them?
b. What are their roles and responsibilities with regard to HRIS?
c. If no, then if the Minister or any authorized person asks for HRH related information, how is that information retrieved?

9. Who are the other stakeholders involved in the adoption of an integrated HRIS process?

Probes:

a. How would you describe the level of engagement amongst all the relevant stakeholders in the HRIS adoption process?
b. Is there a platform available for all the stakeholders to share their ideas with regard to HRIS? If yes, is it formal or informal?
c. If no, how do the relevant stakeholders share ideas?

10. What role do you the private sector can play in the HRIS adoption process?

Probes:

a. Are there any plans to include the private sector?

11. From a departmental perspective, what strategies or policies have you put in place to enable the adoption of an integrated HRIS?

Probes:

a. Have you formulated a minimum data set for all the essential elements to be captured on the HRIS?
b. How do you plan to ensure capacity building for system users, e.g. system training.
c. Is there a specific budget that has been drafted and allocated to HRIS adoption?
d. What are the HRIS monitoring and evaluation policies and procedures with your department
e. What are some of the standard operating procedures that you have developed in your department for data collection, analysis and reporting with HRIS?

f. What are the protocols around data security and confidentiality?
g. What are the protocols around the technical maintenance of the HRIS system?

PART 5: ENVIRONMENT FACTORS

12. What factors outside your department do you think will affect the adoption of an integrated HRIS?

Probes:

a. What lessons and experiences have you as a department learnt from other countries which have implemented national HRIS?
b. Have you received support from multilateral organizations such as WHO in terms of recommendations and guidelines?

Lastly, are there any additional key individuals or organizations that you feel we should interview to understand the process of the adoption of an integrated HRIS better?

Thank you very much for participating in this study, we shall share the results of this study with you when it is finalized.

Thank you for participating in the study

Interview Guide 2: For Statutory Bodies

FACTORS INFLUENCING THE ADOPTION OF A NATIONAL INTEGRATED HUMANRESOURCE INFORMATION SYSTEM IN THE SOUTH AFRICAN HEALTH SECTOR

PART 1: Interviewee Information

d) Participant ID:

e) Date of interview:

f) Biodata
- Gender
- Age
- Organisation/Department

PART 2: GENERAL

1. What is your current job title and responsibility?

Probes:
a. How long have you worked within your current position?
b. In the duration of your employment with your council, have you been involved in any HRIS work?

2. Since 2006, the HRH Strategies have been advocating for a national integrated human resource information system.

Probes:
a. Are you aware of the plans by the department of Health to adopt a national integrated HRIS?
b. What do you think is the role of your council in the adoption of a national integrated HRIS?
c. In your opinion, what are the challenges that could be faced in the HRIS adoption process?
d. From the perceptive of your council, what factors do you think could facilitate HRIS adoption?
e. What do you are the factors that could potentially hinder HRIS adoption.

PART 3: HUMAN FACTORS

3. How do you think the adoption of a national integrated HRIS will affect your council?

4. How do you feel the adoption of a national integrated HRIS will affect your personal roles and responsibilities within the council?

PART 3: TECHNOLOGICAL FACTORS

5. In your opinion, what technological infrastructure is required by your council to successfully participate in the adoption of a national integrated HRIS?

Probes:

a. What tools, systems and equipment are required by the council to aid HRIS adoption?
b. Are such tools, systems and equipment available in your council?

6. Your council is cited a data source that will supply HRH data to the national HRH data warehouse, In what ways will your council's information systems link to the data warehouse?

7. In terms of capacity building for system users, have the members of your council received technical training to use HRIS?

Probes:

a. If yes, what kind of training did they receive?
b. If no, how do think this will affect your council's ability to contribute to HRIS adoption?

8. What are the potential technological barriers that hinder your council's role to contribute to the national HRIS adoption?

PART 4: ORGANIZATION FACTORS

9. Describe your level of involvement in the adoption of an integrated HRIS process.

Probes:

a. Have you engaged with other stakeholders such as the national Department of Health regarding HRIS?
b. Could you describe your engagement with the other stakeholders? What means do you use for your engagements? How often are your engagements? Is there general consensus among all stakeholders?
c. From the councils perceptive, have you shared any ideas with other stakeholders regarding HRIS? If yes, what are some of these ideas?
d. If no, as system implementers, how do you think your ideas or concerns can be addressed?

10. What policies do you have around data sharing with other systems?

Probes:

a. Data security protocols.
b. Data confidentiality protocols
c. Data accuracy controls.

PART 5: ENVIRONMENT FACTORS

11. What factors outside your council do you think will affect the adoption of an integrated HRIS?

Probes:

a. Policies and guidelines from NDOH?
b. Policies and protocols from other statutory bodies?

Lastly, are there any additional key individuals or organizations that you feel that we should interview to understand the process of the adoption of an integrated HRIS better?

Thank you very much for participating in this study, we shall share the results of this study with you when it is finalized.

Thank you for participating in the study

Interview Guide 3: For Health Information System (HISP)

FACTORS INFLUENCING THE ADOPTION OF A NATIONAL INTEGRATED HUMAN RESOURCE INFORMATION SYSTEM IN THE SOUTH AFRICAN HEALTH SECTOR

PART 1: Interviewee Information

g) Participant ID:

h) Date of interview:

i) Biodata
- Gender
- Age
- Organisation/Department

PART 2: GENERAL

1. What is your current job title and responsibility?

Probes:
a. How long have you worked within your current position?
b. In the duration of your employment with HISP, have you been involved in any HRIS work?

2. Since 2006, the HRH Strategies have been advocating for a national integrated human resource information system.

Probes:
a. Are you aware of the plans by the NDOH to adopt an integrated HRIS?
b. As the developers of the system, can you describe the mandate HISP received with regard to HRIS?

3. How would you describe your experience with developing the national integrated Human Resource Information System?

Probes:
a. How long have you been engaging with NDOH?
b. Have you encountered any challenges with regard to HRIS during the development process?

4. From your perspective as system developers, could you comment on what progress has been made towards the adoption of a national integrated human resource information system?

Probes:

a. What activities or developments have been achieved to date towards the adoption of a national integrated HRIS?

5. What do you think are the key factors that can contribute to the success of the adoption of an integrated HRIS?
6. What do you think are the major challenges you are likely to face in the HRIS adoption process? Why?
7. How can the challenges be mitigated to facilitate successful HRIS adoption?

PART 3: HUMAN FACTORS

8. In your opinion, what do you think has been major impetus to having a fully integrated HRIS?
9. Do you feel that HISP as the system users receive ample support and directives from the implementers especially HDOH?

PART 5: TECHNOLOGICAL FACTORS

10. In your opinion, what technological infrastructure is required by your council to enable the success of a national integrated HRIS?

Probes:
a. What tools, systems, equipment are required?
b. Do you have these tools, systems or equipment?

11. In terms of capacity building, what have you done to support the system users?
Probe:
a. Have you provided training to the system users to use the system with ease to accomplish their tasks?

12. What protocols and strategies have you put in place to ensure the functionality and security of HRIS?
Probes:
a. Have you formulated a minimum data set for all the essential elements to be captured on the HRIS?
b. How will HRIS link to the existing information systems?
c. What are the protocols around data security and confidentiality?
d. What are the HRIS monitoring and evaluation policies and strategies you have developed if any?
e. What is the strategy for system maintenance?

PART 6: ORGANIZATION FACTORS

13. As a system developer, describe your level of engagement with the other stakeholders?

Probes:
a. Have you engaged with other relevant stakeholders with regard to HRIS?
b. Have you conducted a needs assessment of the system users?
c. Have you provided a platform for system users to express their challenges or concerns with the system if they arise?

PART 5: ENVIRONMENT FACTORS

14. What factors outside your company do you think will affect the adoption of an integrated HRIS?

Probes:

a. Government support or regulation?
b. Competition from other information system vendors?

Lastly, are there any key individuals or organizations that you feelthat we should interview to understand the process of the adoption of an integrated HRIS better?

Thank you very much for participating in this study, we shall share the results of this study withyou when it is finalized.

Thank you for participating in the study

Interview Guide 4: For Other Relevant Stakeholders

FACTORS INFLUENCING THE ADOPTION OF A NATIONAL INTEGRATED HUMAN RESOURCE INFORMATION SYSTEM IN THE SOUTH AFRICAN HEALTH SECTOR

PART 1: Interviewee Information

a) Participant ID:

b) Date of interview:

c) Biodata
- Gender
- Age
- Organisation/Department

PART 2: GENERAL

What is your current job title and responsibility?
Probes:
- How long have you been working within your current position?
- Are you perhaps familiar with the plans by the department of health to develop and implement a national integrated HRIS?

Since 2006, the HRH strategies have been emphasizing the need for a national integrated HRIS,
Probes:
- In your opinion, why do you that so many years down the line, we still don't have a national integrated HRIS?
- In your view, what progress has been made towards the development of a national integrated human resource information system (HRIS)?
- In your opinion, what have been the challenges that have led to this goal not being achieved today?
- What do you think are the factors that could facilitate the development of an integrated HRIS?
- What are the barriers to the development of an integrated HRIS?
- How do you think these barriers can be mitigated to ensure that the HRIS is developed and implemented successfully.