A systematic literature review of Human Resource Information System (HRIS) usage in the health system of South Africa

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ABSTRACT

This systematic literature review is aimed at determining the predominance of existing studies conducted in HRIS as it relates to HRM, HRH, workforce management and the use of Information Systems (IS) and technology within the health sector. Main findings of the study demonstrate that HRIS benefits are the most researched at 11.8% with a) impact: implementation and IS in healthcare: 10.5%; b) effectiveness: motivation, competence, workforce IS and adoption: 9.2%; c) workforce retention and migration: 7.9% d) HRIS and EHRM for decisions 5.3%, e) HRIS in HRM and digital records 2.6%; f) IT in the healthcare setting standing at 1.3%.

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Introduction

Technologies are prevalent in all professional spheres, including the field of Human Resource Management (HRM). These technologies, despite their various identities, have been the subject of several studies in the fields of social sciences, information technology and psychology (Al-Dmour, Obeidat, Masa'deh, & Almajali, 2015; Ruël & Bondarouk, 2018).

E-HRM and or HRIS permit a paperless functionality of the Human Resource Department (HRD). Within the health sector, the HRM processes such as workforce records management, payroll, and other related activities, can support an efficient healthcare delivery system. Notwithstanding the role of HRIS as enablers of the efficient and effective health sector, the system has been overlooked as a topic of research in the healthcare system of South Africa.

Since systems drive a successful organization, the one that characterizes an efficient Human Resources Department would be based on a Human Resource Information System (HRIS). This systematic literature review is aimed at determining the predominance of existing studies conducted in HRIS as it relates to HRM, HRH, workforce management and the use of Information Systems (IS) and technology within the health sector.

This paper also focuses on the impact, adoption, effectiveness, motivation and benefits of HRIS within the health sector of South Africa. A comprehensive strategy was used in the search and testing of the literature publications in various databases such as Medical/Health, Social Sciences, multidisciplinary research, ICT, Gray literature sources, WHO, AU, relevant professional bodies, and Google Scholar.

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The selected publications were within the period 2009 – 2021. A critical appraisal programme was adopted to ensure a high level of quality for the study. The authors had to participate in each of the various stages of the selection process to choose the appropriate publications for review. Out of 504 publications that were generated, 76 were selected for this review.

Numerous studies of HRIS in health exist but not much in the South African context. This review, therefore, will seek findings on how the utility of HRIS in South Africa is assessed for the health workforce motivation and retention. This study offers a systematic analysis that will assist the healthcare authorities to consider the implementation of effective HRIS for decisions and future research studies.

Theoretical and Conceptual Review

Human Resource Information Systems (HRIS)

HRIS has been defined by several authors in various ways: Kavanagh, Gueutal and Tannenbaum (1990:13) define HRIS as a 'system used to acquire, store, manipulate, analyse, retrieve and distribute pertinent information about an organisation's human resources'; Menant, Gilibert and Sauvezon (2021) describe HRIS as a system consisting of processes, procedures, humans and functions acquiring, conserving, recovering, analysing, handling and distributing information that relates to the human resources of organisations. Conversely, the definitions of Karpagambigai and Poornimarani (2020), as well as Priota (2020), propose the introduction of concepts in acquiring the hardware and software applications to play a facilitating role in the practice, policies and strategies of HRM. HRIS supports a large number of applications such as recruitment management, induction, payroll, incentives, employee appraisals, training and career management, skills and talent management, and succession planning (Geuse, 2007; Menant et al., 2021). Essentially, HRIS is also described as an enabling computerised system that supports workforce information management through both the administrative and strategic decision making of an organisation. HRIS is a sophisticated system that strongly relies on workforce acceptance in dealing with complex issues within the organisation. In fact, according to Barišić, Poór and Bach (2019:586), 'the strongest impact on organisational performance is attained through the intensity of HRIS usage, measured by the number of different functionalities available in the software systems.'

Importance of HRIS

The cost attached to health workforce sustainability accounts for 65-80% of the entire budget and suggests that the management of the human resources within the health system is important to both its clinical and financial perspectives (Tursunbayeva, Bunduchi, Franco, & Pagliari, 2017). HRIS supports a variety of HR practices including recruitment and selection, training and development, performance management, and vital workforce information for effective resource planning and sustainability (Suryanarayana & Bhusal, 2019). The acquisition of any HRIS is dependent on the needs of an organisation. Researchers such as Chakraborty (2015); Matimbwa and Masue (2019); Matsiko (2019); Mohammed (2021) continue to research the effective use of HRIS in the health system within developed economies whereas in emerging economies, the systems have received little to no attention in terms of the implementation, development, adoption, impact, and benefits in research. In fact, HRIS receives less attention when compared to clinical systems such as Health Information System (HIS) and eHealth records (Udekwe, Iwu, de la Harpe, & Daramola, 2021) prompting reviews and further studies to identify ways that can be used to elevate the standing of HRIS to benefit the business, education, health and other sectors.

Reasons for systematic literature review of HRIS in the health system

HRIS has been in use for over 50 years yet studies of the system are still in a developmental stage (Tursunbayeva et al., 2017). There is a marked increase in the demand for sophisticated and ungraded HRIS; however, the functionality within the health system of developed countries and the business sectors, management support for technological advances remains deficient. Some organisations spend huge sums of money to acquire HRIS yet are unable to measure the benefits of the system. A systematic literature review, therefore, seems relevant and timely.

New idea about this literature review

The scope of the study ranges from 2009 to 2021. Previous research specifically on HRIS in the health sector of South Africa was focused on an interdisciplinary systematic literature review that was conducted on extracts from sources such as: Information Communication and Technology (ICT), Information System (IS) and Information Technology (IT) for HRM, social science, health-related studies in IS. The objective of this study was to identify the scope of existing studies pertaining to HRIS in the health system and analyse, classify and synthesise the evidence on the implementation and use, impact, adoption and benefits. Finally, the authors conclude and recommend HRIS research regarding the identified research goals and outcomes of the literature studies as guidelines for the health sector in South Africa.

Research and Methodology

Review Method and A Comprehensive Strategy

A comprehensive strategy was developed to search and test the literature publications at the initial stage. The search was limited to the year 2009 to 2021 as previously mentioned in all the categories; however, there was no restriction on the language used in various literatures.

Publication screening and selection

The outputs were stored in a spreadsheet. The initial screening of titles and abstracts was followed by the manual examination of the full text of the selected publications by the researchers to assess their fit with the inclusion criteria. The researchers took time to ensure that topics that aligned with the focus of the study were accurately selected.

Inclusion and exclusion criteria

The following conditions enabled the selection of documents for this study: (1) if they involve a formal investigation into HRIS either conducted in the academic environment or consulting environment (HR specialist, IT specialist, business consultants); (2) studies in a wider perspective such as business/organisational (Health Department); (3) studies in the range of Enterprise Resource Planning (ERP)/ Health Information System (HIS)/ Human Resource for Health (HRH) systems that specifically examine applications for HR practices; (4) it includes a descriptive literature study. Details of the inclusive publications are mentioned in Appendix below.

Data extract and assessment

The researchers extracted information from all the eligible studies through a structured process which included the year of publication, topic, goal and focus of study, and keywords such as HRM, E-HRM strategies/decision making, implementation and use, health workforce IS, eHealth strategy (digital health, IT in healthcare, IS in healthcare), effectiveness (innovation diffusion), adoption, employee motivation and competence (staff retention), impact (security/privacy, investment), benefits (functionalities, organisational excellence, strategic plans, governance capacity policies/plans, centralisation) (see Appendix). Differentiating among HRIS studies, the researchers had to review each topic and research goals and then code the results in keywords and research outputs. Overall, the researchers appraised the literature selected to ensure consistency throughout the process.

Results

In all, 504 results were generated by the search and 402 titles and abstracts remained after eliminating 102 duplicates of which: 76 were qualified for full-text review and potentially eligible for the study; 327 did not have sufficient information in the title and abstract to make decisions on the subject. The stages of selection were themed for discussion as indicated in Table 1 below. The publication characteristics include articles and other publications between the years 2009 and 2021. More than half of the literatures used were between the years 2010 and 2020. Of the 76 publications, the majority (41 or 53.3%) were journal articles, (20 or 26.7%) thesis/dissertations, conference papers (6 or 8%), reports (5 or 6.7%), working papers (3 or 4%) and books (1 or 1.3%). Based on the observation that HRIS is a multidisciplinary study; 60 or 80% of the literature are HRIS related out of which 95% are HRIS health-related, 9 or 12% covered social sciences in IT and IS in healthcare while 7 or 9.3% covered HRM and E-HRM related studies. Due to the limited studies on HRIS in the health sector of South Africa, the researchers had to focus on the combination of all the literature by narrowing them down to South Africa at (60% of the 76) studies. Furthermore, 1 (1.3%) of the selected publications discussed IT structures in healthcare, 2 (2.6%) discussed HRIS in HRM and digital eHealth records respectively, 5 (5.3%) highlighted HRIS and E-HRM usage in decision making, 6 (7.9%) were used to discuss HRIS in relation to workforce retention and migration, 7 (9.2%) discussed HRIS effectiveness and efficiency, HRIS usage for motivation and competency, HRIS and workforce IS and HRIS adoption respectively, 8 (10.5%) elaborated on HRIS implementation and usage, the impact of HRIS and IS in healthcare respectively. Finally, HRIS benefits were discussed using 9 (11.8%) of the total publications selected for the review.

Research design and study eminence

Most of the reviewed studies (19 or 25.3%) used quantitative methods followed by (17 or 22.7%) literature and systematic review. 13 (17.3%) was for qualitative and mixed-method respectively, 5 (6.7%) for reports such as those from the WHO. 2 (2.7%) were case study reviews, 1 (1.3%) was for statistical review, job satisfaction scale usage, scorecard approach, book chapter, conceptual study and experimental design respectively. Descriptive studies were also included at the full-text review stage. Most of the vital information relating to HRIS in the health sector was extracted from various thesis/dissertations to support journals and other publications that were used to conduct the review.

Table 1 below shows the arrangement of the themes from Appendix as the researchers arranged the flow of the systematic discussions.

Table 1: Summary of themes

CATEGORIES OF THEMES	JOURNAL ARTICLES	THESIS	CONFERENCE PAPERS	REPORTS	BOOKS	WORKING PAPERS
HRIS in HRM	H9	H10				
HRIS & E-HRM for decisions	H25, H35	H24			H57	
HRIS Implementation and use	H1, H14, H33, H67	H15, H41, H42		H28		
HRIS Effectiveness	H34, H53, H65, H70	H19, H29,	H5,			
HRIS and Employee motivation & competence	H43, H46, H73	H44, H59	H6, H66			
HRIS and Workforce retention and migration	H30, H32, H62, H75			H8		H17
HRIS and Workforce information system	H23, H26, H58			H11, H50, H55		H7
HRIS and Digital / eHealth records	H68, H69					
IT in healthcare			H56			
IS in healthcare	H20, H36, H45, H49, H54, H71	H13, H16				
Impact of HRIS	H4, H21, H61, H74	H3, H31, H52				H37
HRIS adoption	H22, H38, H40, H76	H12, H18, H72				
HRIS Benefits	H39, H47, H48, H64	H27, H51, H63	H2, H60			

Note: “H” is used as a serial number to identify each of the selected publications used in the review

Basic concepts

HRIS usage for HRM in the health system

Human resource management (HRM) is a fundamental element in the success of any organisation. The functions of HRM are informally implemented and incongruous with the HRIS of the South African health system (Potgieter & Mokomane, 2020). Several factors that affect a destabilised HRM structure in the South African health system include a need for coordination within HR components, role clarifications, capacity building and improvement in HRIS for proper workforce accountability (Mathews, 2017). In our view, in terms of the administrative and strategic perspectives, recommendations for addressing the effective utilisation of HRIS in the health system are yet to be accomplished.

HRIS and E-HRM for decision making in the health system

Global strides in technology have increased the use of E-HRM in organisations around the world. Ukandu (2015) assessed and compared the use of E-HRM for decision-making in parastatals of South Africa and Nigeria, and realised that a lack of full implementation, limited internet access, poor supply of electricity and lack of sophisticated software such as HRIS hindered effective E-HRM for decision making. Intensified investment in HRIS would facilitate decision-making in South African parastatals (Ukandu, Iwu & Allen-Ile, 2014). The fact that E-HRM has the capacity to improve organisational efficiency and the role of HR as a strategic partner (Poisat & Mey, 2017), supports the argument that E-HRM reduces cost and increases efficiency (Ruël & Bondarouk, 2018).

Discussions

Implementation and use of HRIS in the health system

The implementation and use of HRIS in the health systems are hampered by various factors. Udekwe and de la Harpe (2017) conducted a study on the reasons for the deficiency of HRIS in the Western Cape of South Africa and found that these stemmed from factors such as lack of knowledge and education. Notably, the continued preference for manual systems, dilapidated/outdated infrastructures leads to a severe lack of access and information of all skilled workforce details in the system. Essentially, HRIS is under-utilised due to poor training and the high cost of implementation and maintenance. Butt’s (2020) study on the implementation of HRIS found that the lack of IT proficiency, IT structure, financial unwillingness and top management support have negatively affected the use of HRIS for competitive advantage. For competitive advantage to be achieved, Davarpanah and Mohamed (2020) are of the view that health workforce satisfaction brings about the optimised efficiency of the system (i.e. HRIS).

Esanga, Viadro, McManus, Wesson, Matoko, Ngumbu, Gilroy and Trudeau (2017) highlight the high levels of administrative challenges. Chakraborty (2015) and Settle, Lwetabe, Puckett and Leitner (2014) highlights the need for an effective policy for HRIS

implementation. Following the policy argument is the need for the government to increase the budget allocation to strengthen and coordinate the implementation of HRIS in the health system (Matsiko, 2019).

Effectiveness of HRIS in the health system

Even where HRIS has been implemented, its effectiveness is marred by the continued preference for manual systems. A successful implementation of HRIS in the health sector of South Africa necessitates addressing the challenges faced by the use of manual systems in handling employees personal details such as inaccuracy, incomplete and not updated workers information (Matimbwa, Shillingi, & Masue, 2021). Doing this will likely eliminate challenges such as lack of IT equipment and skilled personnel to support HRIS, increase in system usage and workforce leading to commitment and experience in HRIS, completeness, accuracy and the timeliness of information captured and frequent training on IT skills offered to employees (Maruru, 2014). Perhaps the under-utilisation of HRIS needs more research explanation given that the various studies point to the lack of sufficient funding by stakeholders such as the government.

In South Africa, despite the investments in HRIS by the government and organisations, the system is still not fully utilised (Iwu & Benedict, 2013).

The effectiveness of HRIS is also affected by unsecured behaviours that result in the non-malicious security interruptions in the health system which, according to Zafar, Randolph and Martin (2017) suggest the need to introduce effective security, education, training, awareness programme and a framework for future investigation to identify unconscious habits in the security of HRIS. Mabaso (2020) argues in favour of proper automation of processes for security purposes. Could this be why Randle, Coleman and Kekwaletswe (2017b) suggest the need for a model that can assist in a better understanding of ways to fully implement HRIS? In short, the need to conduct studies to address the impact of innovation diffusion as it relates to HRIS functionalities for an effective and fully operational health system is evident (Obeidat, 2012).

HRIS on employee motivation and competence in the health system

HRIS underutilisation does have an effect on employees motivation in South Africa (Randle, Coleman, & Kekwaletswe, 2017a). Optimising the usage of human capital through HRIS extends its benefits as well as a reduction in workforce dissatisfaction (Chakraborty & Khan, 2019). In this regard, leveraging the optimised functionality of technology can enable the aspects of recruitment, selection, training and development on boarding practices within the health sector (Chukwu, 2017). Essentially, mainstream HRIS deployment strengthens the productivity and competence levels of the workforce (Maduagwu & Ugwu, 2018).

A study conducted in Africa indicates the need to improve efficiency, promote HR functions and development for effective employee performance, commitment and competence using HRIS in health (Juma, 2018). Further, an enhanced competence of HRD through automation, objectivity, reliability, accuracy and responsiveness of organisations through an effective HRIS improves HR practices (Singh & Tagiya, 2017).

There are limited studies on the application of HRIS to staff motivation and retention management. In resolving this, Pouransari, Al-Karaghoul and Dey (2016) advise the need to adopt the Institutional Theory and Job Characteristics Theory, to provide a perspective to both internal and external staff motivation, turnover, remuneration, training and other growth opportunities through the use of HRIS for the effective health system.

HRIS in workforce retention and migration in the health system

There is a lack of information regarding the status of HRH in South Africa where there is high demand for the health workforce. The study conducted by Nyoni and Gedik (2012) on the health workforce governance in South Africa - by assessing the steps to follow in the governance of HRH - realised that the South African health system operates in a decentralised HR system which makes it difficult to monitor and manage the retention of skilled health workers, especially in remote areas. According to Dambisya, Malema, Dulo, Matinhure and Kadama (2013), South Africa appears to have reasonable success in addressing health workforce migration as compared to other African countries with the introduction of the Occupational Specific Dispensation (OSD) programme. Nwadiuko, Switzer, Stern, Day and Paina (2021) describe OSD as revised salary structures that are unique to specially identified skilled workers in the public service.

Retention of the health workforce is crucial to service delivery in South Africa. The preponderance of the health workforce to greener pastures has the potential of rendering the sector ineffective. Factors such as job insecurity, high level of absenteeism and the high turnover rate can be determined through an effective HRIS. These factors are still a major challenge in the South African health system which is why there is a high rate of staff turnover in the health workforce in the country. There is a need to readdress the above-mentioned factors for effective retention of skilled health care professionals in South Africa and to design strategies on the use of HRIS to assist in the enhancement of sustainable community health worker performance towards workforce retention (Naimoli, Perry, Townsend, Frymus, & McCaffery, 2015). Continued emigration of health workforce – paramedics, and several other professionals – has been decried by researchers such as (Iwu, (2013), Iwu, Allen-Ile and Ukpere (2012), and Iwu (2014).

HRIS and HRH workforce information system

The Human Resource for Health (HRH) crisis is attributable to global health workforce shortages, skills imbalance, maldistribution, migration, poor performance and low motivation (Ditlopo, Blaauw, & Lagarde, 2017). Culprits such as the lack of adequate HRIS for workforce management, planning, comprehensive database and tracking system of available health personnel in South Africa are contributing factors. WHO (2015) report mentions that most countries in Africa make use of a standard HRIS, but the systems are not modified to the latest technology, lack a comprehensive health workers registry and are not able to assist in exchanging health workforce data between the different HRIS applications systems.

The increase in the number of maternal newborn and child deaths according to Pozo-Martin, Nove, Lopes, Campbell, Buchan, Dussault, Kunjumen, Cometto and Siyam (2017) is caused by poor IS and practices in the development of the health workforce metrics. Sophisticated workforce planning methods to align with Universal Health Coverage (UHC) and the National Health Workforce (NHW) have limited the HRH effectiveness. There are few documented studies in the use of HRIS and HRH planning but Riley et al. (2012), specifies that most countries experience a crisis in HRH shortages and are unable to provide an accurate report on data of health workers qualifications and credentials due to an unsophisticated HRIS system.

The WHO (2010) report aims to initiate a discussion on how to promote a coordinated and standardised approach to strengthening workforce information, a monitoring system as well as the need for an action plan to assist in providing adequate and equitable healthcare services in Africa. A further report by WHO (2013), specifies that Africa's efforts to ensure adequate HRH are subject to various challenges such as; inadequate capacity of HRM, low HRH delivery, low level of skills improvement, slow pace of education reform, poor incentives, poor retention strategies and a lack of an effective information system such as HRIS in health.

HRH restrictions are major barriers to the sustainability of upscaling programmes in sub-Sahara Africa. Zakumumpa, Taiwo, Muganzi and Ssengooba (2016) state that more approaches to HRH restrictions through the use of HRIS have been taken as global policy on strategic guidelines to; provide financial and non-financial incentives to health workers, workload reduction through spaced clinic appointments, training workshops, management support, adoption of non-physicians staffing models, and devising enhanced program leadership styles. Such guidelines challenge the achievement of an effective workforce IS using HRIS.

HRIS for electronic health (eHealth) records

A study on the development of HRIS in eHealth strategy, standards and guidelines for health and workforce records adoption in the public hospitals was conducted by Muinga, Magare, Monda, Kamau, Houston, Fraser, Powell, English and Paton (2018), introduced health and workforce IT projects such as District Health Information Software (DHIS) and International Quality Health Workforce Management Information System (IQHW-MIS) to manage the health and workforce system were introduced yet there has been no identified or achievable objectives as a result. However, Muinga, Magare, Monda, English, Fraser, Powell and Paton (2020) produced a study on the provision of a Digital Health System (DHS) to assist in the strategic decision in health - it reveals the need for significant work required to ensure synergy between HRIS and other IS within other health services in South Africa for effective digitisation.

As IS in the HR of the health system relates to service delivery, the current HRIS cannot produce reports to track workers in health and no interrelation between the systems exists (Mavuso, 2016). However, the high waiting periods at hospitals in South Africa points to the lack of HRIS for proper health workforce records, tracking systems to monitor the sizeable workforce in the hospitals, a backlog in service delivery due to shortage of health workers and workload, poor work ethics, lack of seriousness in the use of HRIS by the government (Piquer, 2017).

The skilled health workforce tracking system is considered critical for planning and achieving quality healthcare. Chen et al. (2014) mention the existence of such an information system to track and monitor the health workforce in sub-Saharan African countries is still limited and the need to increase the demand and supply for a developed system is important. There is an increasing number of decentralised HRIS processes in the devolution of HR and management information in the South African health system (Scott, Dinginto & Xapile, 2015).

Eboreime, Abimbola, Obi, Ebirim, Olubajo, Eyles, Nxumalo and Mambulu (2017) concluded a study on the implementation of an integrated primary eHealth policy on decentralised governance in the health system and realise the lack of HRIS functionalities to support eHealth policy and governance affected its outcomes. Ilorah, Ditsa and Mokwena (2017) are of the view that eHealth does not solve most of the problems affecting the rural healthcare of South Africa due to a lack of electricity/load shedding and other amenities including a lack of sophisticated infrastructures to support the eHealth system.

Afrizal, Handayani, Hidayanto, Eryando, Budiharsana and Martha (2019), identified four (4) themes as barriers in the implementation of Primary Healthcare Information System (PHCIS) such as; insufficient human resources, poor infrastructure, lack of organisational support and processing factors, and the lack of effective HRIS as the identified implementation barriers. HRIS usage can assist to; strengthen staff competency, improve technology infrastructure, increase organisational support with more investment in PHCIS, and redesign the PHCIS to accommodate the basic process of health and HR systems. Tetteh (2014) introduced the state of the art framework on IS implementation in the health system of sub-Sahara Africa and came up with suggestions to use a theoretical framework that will assist to enhance the successful HRIS implementation in the PHCIS. Interestingly, Marful and Winter (2014) presented an HRIS analysis of literature studies selected according to their potential contribution to the implementation of HRH in Africa and concluded that HRIS has a bright future in healthcare management but obstacles such as political instability, social and economic insecurity have a negative impact on its implementation in the eHealth records system.

Impact of HRIS in the health system

The impact of HRIS in the health system of South Africa is still not realised. A study conducted by Udekwe (2016) focused on the impact of HRIS in the South African sector and revealed that the sector was yet to optimally use HRIS. He further noted that the sector relied more on archaic, manual systems. This is not peculiar to South Africa. de Vries, Settle and McQuide (2009) noted that most Low and Medium Income Countries (LMIC) depend on a paper-based and simple electronic spreadsheet that is not linked or connected to HRIS, which does create unreliable system.

A factor that begs attention regarding the impact of HRIS is the perception of workers to its privacy orientation. Lukaszewski, Stone and Johnson (2016) also emphasise that workers perceive that access to HRIS could be 'more of an invasion of privacy'. This view seems consistent with Iwu and Benedict (2013) who highlight the level of trust and confidence in HRIS to focus on what it should. HRIS is commonly used for administrative purposes and the need for concentrated investment in HRIS to gain competitive advantage is important. Therefore, increased use of HRIS is paramount to sustain organisational performance (Barišić, Poór & Bach, 2019). Whatever the case, the effectiveness of HRIS relies on strong managerial support (Okwang, 2020). Afterall, HRIS' usefulness in ensuring organisational benefits deserves various support mechanisms (Dlamini, 2012). Kumar and Parumasur (2013) further this view by emphasising that effective management decisions and HR strategies are realisable through a well-implemented and managed HRIS.

HRIS adoption in the health system

A successful healthcare vision and objectives are based on the adoption and use of HRIS in the South African health system. Mazabelena (2015) produced a study on the adoption failures of numerous HRIS projects in a municipality within South Africa that shows how technology was not prioritised and instead acceded to pressure from the workers in trying to use the system without following the proper procedures. Furthermore, the mindset and resistance to include the entire workforce by the management in the adoption process was a challenge and the need to have an HRIS that integrates all the HR functions is required. Also, Phahlane (2017) suggests the use of a multidimensional framework such as Upper Echelon Theory (UET), Social Cognitive Theory (SOT), TOE Framework and Task-Technology Fit (TT-fit) to run an effective HRIS system.

An abundance of health workers in Africa is pivotal to achieving organisational objectives. Were et al. (2019) study on the need for an evidence-based strategy to scale up the health workforce suggests the need to adopt an HRIS for effective communication strategy, collaborative planning, teamwork and the required skills for effective adoption of HRIS in place. However, Alam, Masum, Beh and Hong (2016) combines two HRIS adoption theories - Human Organisational Technology Fit (HOT-fit) Model and TOE Framework - and suggests the need for significant technological components to be implemented in organisational, human and environmental perspectives to better assist in an adoption process of HRIS in Africa.

A systematic review on HRIS in healthcare by Tursunbayeva et al. (2017), addresses the capacity to improve quality and efficiency in the health system and offer decisions to consider the current implementation and adoption of HRIS in health. Aletaibi (2016) purports that the use of the DeLone and McLean HRIS could be utilised to develop a new model that provides a comprehensive perception of important factors that influence the adoption of HRIS such as usefulness, faster decision-making process, system quality, ease of use, social and peer pressures, and the unification of systems. A descriptive study on the adoption of HRIS in the South African health sector was conducted by Udekwe et al, (2021), that reveal research in HRIS usage as low and in need of a support structure that will assist to increase research in the healthcare category for regular upgrade and technology improvement for service delivery and sustainability.

Benefits of HRIS in the health system

The benefits of HRIS in health are still immeasurable. Ngwenya, Aigbavboa and Thwala (2019) conducted a study on the benefits of HRIS in South African organisations and found wasteful government expenditure in funding developed information systems that are not fully functional, outdated and not aligned to the latest technology. Chumo (2014) identifies the relationship between HRIS and staff development and opines that the benefits of HRIS cannot be measured due to a lack of effective staff development and workers not having access to HRIS.

Mohammed (2021) points to the need for increased participation in the process of change and organisational excellence by recommending effective management that assists in adapting to changes in relation to the identified benefits of HRIS in healthcare facilities. Barišić, Pejić Bach and Miloloža (2018) believe that the benefit of HRIS is an unpredictable component of modern organisational systems and the current HRIS provides only the administrative settings. The need to produce quality strategic decisions in HR with benefits is yet to be achieved. Consequently, Afriyie, Nyoni and Ahmat (2019) highlight the notion that sub-Saharan African countries are not meeting the National Health Strategic Plans (NHSP) for HRIS effectiveness to monitor the health workforce in the region.

The influence of HRIS on organisational performance and benefits are still a great challenge. Otieno (2016) raises the lack of access to HRIS by the entire workforce can have a negative effect; by not making use of self-service systems coupled with the lack of skilled employees on HRIS is necessary to fully realise the benefits of the system. Moreover, Kemei (2016) study on the influence of HRIS

utilisation shows that information generated from self-service systems assist to increase flexibility and performance, but the optimal usage in terms of investments to upgrade the functionalities is still a challenge that needs to be addressed.

Nyoni and Gedik (2012) also elaborate on the benefits of HRIS in health workforce governance and leadership capacity in Africa. This leads to a lack of sufficient funds and government capacity to ensure an effective and sustainable health workforce that provides effective services. Alhazemi (2017) highlights the lack of awareness among organisations in developing countries and the lack of a centralised system to standardise HR practices affect its potential benefits.

Key messages

HRIS's are under-researched in the healthcare literature setting and the potential to contribute enormously to an information/technology-driven health system is overlooked.

Most research conducted in HRIS is based on simplified evidence which creates gaps in terms of existing knowledge on the effective use, adoption, impact and benefits of HRIS – a clear call for further study on HRIS specifically in the health system.

This study adopted an interdisciplinary characteristic of systematic literature to capture the social and technical factors of an effective HRIS. In the study, the researchers reviewed literature in different aspects of the sector and different countries but mostly Africa because of the few studies conducted in the health system of South Africa. Due to the high rate of demand in health services and its lack of adequately skilled personnel, there is a need to influence the health authorities to encourage intensified usage of information systems such as HRIS to support, motivate and retain the skilled health workforce is important.

Conclusion

HRIS usage in the health system of South Africa faces great challenges in terms of its efficiency and effectiveness towards the sustainability of the sector. The current HRIS in the South African health system is outdated and underutilised which undermines the effectiveness of the health system. Also noted in the study is the issue of the HRIS used for administration in that not all workers have access and therefore do not make adequate use of HRIS. Lack of government support of the health system importance within the economy and the use of current HRIS has a negative impact on employee motivation and competence. There is a need to have an effective HRIS platform for workforce integration and a formulated strategy to assist in the health system productivity. The introduction of the Occupational Specific Dispensation (OSD) programme by the Department of Health, South Africa (DOH, SA) was a great move to assist in sustaining the sector while the need to interrelate the programme in the HRIS is required for the programme to be effective. The lack of sufficient support and investment to improve and advance HRIS in the development and sustainability of the health system is a challenge that must be further investigated. This will assist the government in providing solutions on how to support HRIS through building and developing a flexible workforce environment by upgrading HRIS for: ICT proficiency and structures, e-recruitment, e-learning, e-application, and e-self-service. The health system requires an action plan for workforce IS, a motivation strategy for workers and a non-physician staffing model in the HRIS for strategic decisions and workforce sustainability. This review serves as criteria to fill important gaps in the health informatics literature which can be a useful reference point for government and healthcare authorities in the effective use of IS's such as HRIS. This could also be used for academic studies, IS in health, policy and legislation relating to workforce management and research sponsors investing in health informatics.

This study includes descriptive literature reviews that were mostly conducted by researchers in various disciplines of case studies reviewed in HRIS. The timeline of this review identifies recent studies between the years 2009 - 2021; multiple publications that emerged were eliminated. The works of literature were mostly on HRIS, IS's in the health sector and South Africa. These were done to represent the overall findings of the study and the related activities. This review was able to identify the positive and negative results of most of the published studies to give a clear understanding of HRIS and its impact on the health system of South Africa

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Appendix

Appendix 1: Characteristics of the included publications examined in the review within the years (2009-2021)

S/N	Authors, Year	Topic	Journal	Research goals	Study design	Keywords	Reported outcomes
H1	Udekwe and de la Harpe (2017)	Use of HRIS in organisations of WC, SA	SA Journal of HRM/ South Africa	Explore the reasons for poor implementation, maintenance and use of HRISs within organisations in the Western Cape	Qualitative, method	Use of HRIS	This research shows an under-utilisation of the HRIS in an organisation due to poor data quality, poor training, and high cost of implementation and maintenance of HRIS. Further identification is a gap in the use of HRIS for data analytics and report generation; this prevents the organisations from benefiting from the use of HRIS.
H2	Ngwenya, Aigbavboa and Thwala (2019)	Benefits of HRIS in SA Organisation	Conference on Sustainable Infrastructure Development	The identified problem is the issue of the government wasting expenditure in funding a developed information system that is not fully functional, primitive, and not technologically updated.	Quantitative research approach	Benefits of HRIS	There is the notion that HRIS is known as a management system that is in accordance with the legislation that governs labour relations in the country. This provides a clear vision to businesses and increases efficiency to the organisation.
H3	Udekwe (2016)	Impact of HRIS in organisation, WC, SA	Thesis of Cape Peninsula University of Technology	The impact HRISs have by reassessing its functions, problems, prospects, and benefits in organisations. It further focuses on the use of HRISs to explore the implementation and benefits that the system can offer in terms of the contribution to organisations.	Qualitative	Impact of HRIS	The outcome shows that organisations involved do not make good use of HRIS to its full potential; they make use of other information systems and manual systems to support HRIS.
H4	Iwu and Benedict (2013)	Economic Recession and HRIS in SA sector	Journal of Management Development	The level of trust and confidence in HRIS during the recession was low and shows an absence of commitment in supporting technology during a recession.	Quantitative	Investment in HRIS	It was realised that even in the time of economic recession, the sustainable use of HRIS does not pose a risk factor to warrant cost-cutting measures.
H5	Randle, Coleman and Kekwaletswa (2017b)	Motivational Based Model for Effective HRIS in SA parastatals	Conference on Information Society	The major problem is that South African tertiary are investing greatly in HRIS utilisation, but the system is not fully utilised. The study further focused on the factors that influence the underutilisation of HRIS within the South African tertiary environment.	Qualitative method	Model of effective HRIS	The outcome of the study was a provision of a theoretical model that will assist in the promotion of effective utilisation of HRIS within the South African tertiary context.
H6	Randle, Coleman and Kekwaletswa (2017a)	Systems Mechanisms on Employees Motivation to Effective Use HRIS in SA	Conference on Advances in Computing Communications and Informatics,	HRIS is highly underutilised in South African tertiary and the need to understand the ways to identify the impact of employee motivation have on the poor utilisation of HRIS in the South African tertiary sector.	quantitative approach	Employee motivation and HRIS	The study adopted a Self-Deterministic Theory (SDT) of workforce motivation due to the unique emphasis on both intrinsic and extrinsic motivation in this study. Further inclusion of Organisational System Mechanisms (OSM) serves as the external factors that can positively or negatively influence the usage of HRIS to support employee motivation in the South African tertiary context. A further discovery is that organisational culture and politics have a strong influence on workers willingness to effectively utilise HRIS in the South African tertiary sector.

H7	Ditlopo, Blaauw and Lagarde (2017)	Job Choices of Cohort of SA Nurses to Inform HR Policy Interventions	Working paper by University of the Witwatersrand and London School of Hygiene & Tropical Medicine	The HRH crisis is not only attributable to global health workforce shortages, but also the skills imbalance, maldistribution, migration, poor performance and low motivation in the health sector. Furthermore, there is a lack of adequate information systems for HR planning and management in health. The availability of a detailed database of health personnel available in (HIC). Such database with such information is still not available in Low and Medium Income Countries (LMIC) such as South Africa	Qualitative and quantitative methods	HR policy intervention in SA health sector	The introduction of longitudinal HR data tracking system of the health workforce could be useful if incorporated into national HRIS. Longitudinal HR data tracking over six years has been tried in two provinces in South Africa and has proven successful, but the lack of policy intervention to attract workers in rural areas and the support of the database exists in South Africa
H8	Nyoni and Gedik (2012)	Health Workforce Governance and Leadership Capacity in the Ministries of Health, SA	HRH Observer and WHO	There is a lack of information regarding the overall status of HRH in countries such as South Africa where there is a high demand for a healthy workforce. The study further looked at the capacity of the ministry of health governance of the HRH with more emphasis on the national, provincial, and local government section and assessing the steps to follow in the governance of the HRH capabilities.	Mixed method approach	Health workforce governance	The lack of adequate HR planning and management capacity at the national level of the government in the form of decentralised HR system that is implemented in South Africa, of which most of such systems is still being guided by the national resource process and procedures but is not limited to the health ministry. The aspect of increasing the capacity of the national level of government will have to include the retention of health workers, especially in the remote areas and have a system to coordinate the information of the health workers in South Africa.
H9	Potgieter and Mokomane (2020)	Implementation of HRM functions in organisations in Gauteng, SA	SA Journal of HRM	This study was initiated because the functions of HRM in terms of the selection, recruitment, orientation, training and development, remuneration and benefits, performance management, labour relations and HRIS usage, were informally implemented and at the same time acknowledged to be effective which is crucial and unaccepted by the study.	qualitative research design	HRM implementation	It was found that lack of sufficient budget, lack of resources and capacity, insufficient systems, unfavourable employment relationships, lack of knowledge and understanding of HRM functions and economic instability have negatively affected the implementation of HRM functions within the organisations and therefore negatively impacted the performance of the sectors in general.
H10	Mathews (2017)	Decentralised HRM in a District Health System of WC, SA	Thesis of the University of the Western Cape	The study identifies the problems of HRM in the public health sector of South Africa, focusing on the factors that influence HRM both on the internal perspective of the administrative functions and the external perspective of the strategic decisions in the health sector	Mixed method	Decentralised HRM in health	It was found that there was an absence of clear roles and responsibilities in performing HRM in terms of the difference in orientations, backgrounds, and priorities of different managers. Also found is that the shared role of HRM was undermined by the absence of reliable information between the managers causing duplication in the information system. To strengthen the HRM system in the national and district health department, there is a need for a cordial relationship between the managers with a sharing vision and objectives for HRM, improving an alignment through coordination within HR components, role clarification, capacity building,

							improving HRIS and position accountability framework
H11	WHO (2015)	HR for HIS Minimum Data Set for Health Workforce Registry	World Health Organization	This study provides a standardised HR system for health workforce planners and decision making through the development of an electronic system or the modification of the existing system to document the health workers within the national and provincial contexts.	Report	Health workforce registry	It was found that the minimum data set for the health workforce registry that was provided in this document can be used by the ministries of health in various countries as a standardised health workforce information system. It allows standard data values within existing electronic HRH. It can also be appropriately utilised in the health sectors as a functional electronic health workforce registry that can be designed to enable health workforce data interoperability. It will have the ability to exchange health workforce data between software applications and computers within a wide national health information system.
H12	Mazabelena (2015)	Employees' Perceptions on Adoption of a HRIS in District Municipality, SA	Thesis of University of Kwazulu-Natal	Studies show that HIS adoption failures have been documented indicating the failure of numerous HRIS projects due to several reasons. This is an indication that the change process was negatively affected during the process, where a huge amount of funds was already spent, yet the process was not successfully concluded.	Qualitative	Adoption of HRIS	The outcome of the study shows that technology in HRIS is underutilised. This is an indication that the municipality must deal with resistance and carry everyone along including the top management support in the adoption of HRIS. They need to make sure that there is HRIS that integrates all the HR functions of the organisation.
H13	Piquer (2017)	High Waiting Times at a Community Health Centre in CT, SA	Thesis of the University of Western Cape	During the investigation of the CHC in Cape Town on the excessive waiting time of patients that creates a backlog in the service delivery of the sector, affecting both the patients, workers, and the sector in general.	qualitative explorative study design	Waiting time of patients in CHC	The main reasons given by the patients and workers on why such problems still exist in the health sector of South Africa: lack of poor work ethics, the power differential between workers and the idea that the sector has authority issues and no proper system in place to monitor and control what goes on in the health centres.
H14	Esanga et al. (2017)	HRIS used to Mobilise Domestic Resources for an Improved Health Workforce in Africa	Health Policy and Planning	In some African countries, it has been shown that health workforce management and compensation are issues that require attention, which include the existence of ghost workers. Identifying the need for a reliable health workforce information system of which they need to implement an HRIS as an open-source HR system to facilitate health workforce management.	Qualitative	Improve health workforce using HRIS	The outcome indicates that a reasonable number of health workers are ghost workers in their payroll system and indicates some workers are risk allowance recipients. The need for an accurate and audited health workforce record system is implemented to assist the government to understand the health workforce characteristics and direct and control the workforce in the country.
H15	Chakraborty (2015)	Determinants of HRIS Actual Usage in the private health sector	Thesis of Universiti Teknologi Malaysia	The study aims to identify the critical factors influencing the actual usage of HRIS; the study further seeks to investigate the level of influence of those factors on the use of HRIS in the private healthcare sector.	quantitative research approach	HRIS usage in the health sector	The outcome of the study from the analysis point of view shows that only organisational support has a significant degree of influence on the use of HRIS. The findings indicate that the use of HRIS can be ensured if organisational support is continuous in the entire post-adoption phase in the sector.
H16	Mavuso (2016)	Impact of IS on Healthcare	Thesis of Management	The study focused on different IS used by the Ministry of Health for HR,	Qualitative data and	IS on healthcare services	The outcome shows that the IS used by the Ministry of Health in Swaziland can improve the public

		Services in Swaziland, Africa	College of Southern Africa	medicines and other medical equipment and conditions. The study further seeks to provide the negative impact of unfavourable use of IS in the health sector and the impact on service delivery to the public by conducting more studies on how those IS can be used to improve service delivery.	desktop review		healthcare system where the HRIS can produce reports on the health workforce in facilities and assist to track patients adherence to treatment. The use of Client Management Information System (CMIS) to capture information of patients medical history need to be interrelated with HRIS, for a single platform of IS in the health sector.
H17	Dambisya et al. (2013)	Engagement of African Countries on the WHO Practice on the International Recruitment of Health Personnel	Equinet Discussion paper	The purpose of this report is WHO global code of practice on international recruitment of health workforce that was adopted at the World Health Assembly (WHA) in May 2010, was an effort to address the unfair distribution and skills shortages of the health workforce in Africa. Africa being the main reason for the development of the code of which its adoption was only successful in four (4) African countries out of which only one (1) submitted their reports to the WHO for review.	Extensive review of literature on codes of practice	Code of Practice on International Recruitment of Health workers	South Africa appears to have reasonable success in addressing health workforce migration as compared to other African countries which can be used as an example for others to follow and learn. It appears that they have restricted the recruitment of healthcare professionals by introducing an Occupational Specific Dispensation (OSD) Programme to keep many healthcare workers in the country through the substantial increase in their wages and incentives to stay in the country.
H18	Phahlane (2017)	Framework for HRIS Adoption and Use in SA parastatals	Thesis of University of the Witwatersrand	This study indicates that the adoption and use of HRIS are critical to the achievement of organisational visions and objectives, furthermore, literature studies are still in the infancy level with no identified study conducted in the South African university context.	A qualitative inductive approach	Adoption framework of HRIS	The outcome is to conceptualise the multidimensional framework using the Upper echelon theory; Social cognitive theory; Technology, organizational and environment framework; and Task-technology fit, to come up with an effective system in place of HRIS adoption in the South African university.
H19	Mabaso (2020)	Model for Effective Use of HRIS in SA State Owned organisations	Thesis of University of South Africa	There is inadequate literature on the use of HRIS in State-owned Enterprises in the South Africa context; there is an indication that even with the huge investment in the procurement of HRIS in SOE, there are continuous challenges and issues affecting HR operations and administration. Although, with the HRIS automation in the sector, job application and recruitment are still manually processed which is an indication that the high cost of implementation of HRIS in the sector, still possess an ineffective and underutilisation of the HRIS in the SOE.	A quantitative method	Model of HRIS usage	The outcome of the study explains the use of subsequent effective use of HRIS using a triangulation theory as a theoretical framework; the theories are UTAUT, Self Determination Theory (SDT), and Representation Theory (RT). The theories were employed to explore and explain the use of effective HRIS, and a model that practically explains the factors that must be considered for effective use of HRIS.
H20	Chen et al. (2014)	Physician Tracking system in sub-Saharan Africa	Human Resources for Health	A skilled health workforce tracking system is a critical information system for the health sector in planning as also for activating the advancement of the sector for quality healthcare and having a regulated workforce system, education and emergency system. Such an	Review of literature	Health workforce tracking system	The outcome is that skilled health workforce tracking system is different across various countries and the challenges are equally different. There appears to be an increase in the demand for such a system to be developed in terms of innovative ideas to create a sustainable system in place. Some opportunities exist to expand these

				information system for tracking and monitor of the health workforce in the sub-Saharan African countries is still limited.			systems in a more coordinated manner that will lead to better workforce planning, implementation, and sustainable workforce in the health sector.
H21	Kumar and Parumasur (2013)	Managerial Perceptions on impact of HRIS on Organizational Efficiency	Economics and Behavioural Studies	This study assesses the impact of HRIS on HR functions, time management, cost management, managerial satisfaction, and organisational efficiency. A further indication that managers have an impartial view of HRIS impact on the effectiveness of organisations, with a great degree of confidence being placed on time management and HR functionalities in HRIS.	Quantitative method	impact of HRIS	The study reveals that a well-implemented and managed HRIS enables ready and available information to be translated into an efficient sharing system with great knowledge transfer and management. Also, on the fact that HRIS has the potential to augment the quality and speed of the process of decisions, the efficacy of HR strategy and thereby enhanced Organisational effectiveness.
H22	Were et al. (2019)	South-South Collaboration on HRIS in Health of Africa	Human Resources for Health	The shortage of health workforce in most African countries is defective in achieving healthcare development goals. The need is to encourage the development of an evidence-based strategy to scale up the health workforce and bridge the gap in the health sector. The South-South collaboration has tried to gain popularity due to similarities in the challenges faced among the countries involved. The strategy has been implemented in trade, education and other sectors including the health sector. This study is a road map to using a South-South collaboration to develop HRIS to upscale the health workforce.	Report analysis	HRIS collaboration	The outcome highlights the need to adopt an HRIS for effective communication strategies, collaborative planning, teamwork, eagerness to learn and having the minimum technical skills from the recipient countries as learning lessons from the collaboration. The result of the collaboration shows that the countries involved were not successful in proving their performance of the implementation. This study provides a unique experience in the use of HRIS and illustrates the steps and resources needed to identify the successes and challenges in undertaking such collaboration.
H23	Pozo-Martin et al. (2017)	Health Workforce Metrics Pre- and Post-2015: A Stimulus to Public Policy and Planning	Human Resources for Health	The study describes the major characteristics of available health workforce data where several countries identified the countdown of 95% of the world maternal new-born and child deaths due to poor information systems in place for an effective health workforce. It calls for further discussion of best practices in the development of health workforce metrics.	Global Health Workforce Statistics database	Health workforce metrics	The outcome is the availability, quality and comparability of global health workforce metrics remain limited, most published workforce studies are descriptive but more sophisticated workforce planning methods are required. The need for high quality comprehensive, interoperable source of HRH information to support the policies towards the UHC and National Health Workforce is a very promising move towards purposive health workforce metrics. Such information will allow more countries to apply the latest methods for health workforce planning.
H24	Ukandu (2015)	Utilisation of E-HRMS as a Decision-Making Tool by Selected SA and Nigerian Universities	Thesis of Cape Peninsula University of Technology	The study aims to assess and compare the use of E-HRM as a decision-making mechanism in selected universities to determine the extent of using E-HRM in those selected tertiary. The study aims to assess the effectiveness and efficiency	Mixed method	Compare and assess of E-HRM	The outcome was a statistical difference that exists in the use of E-HRM in the areas of recruitment and selection, performance management and training. The study further confirms a lack of full implementation and use in those selected organisations which are caused by lack of internet

				of information and decisions for HR practitioners in the selected sector and propose a model for utilisation of E-HRM for HRM functions.			access, poor supply of electricity, lack of software's to name a few. Providing the facilities and software to the universities will assist to improve the effective use of E-HRM.
H25	Ukandu, Iwu and Allen-Ile (2014)	Influence of E-HRM in Decision Making in SA parastatals	Problems and Perspectives in Management.	The study aims to explore the influence of E-HRM in decision making, specifically to uncover the challenges and benefits of using E-HRM in the HRM functions in South African universities.	Mixed method	E-HRM for decision making	The outcome was a need for management support to the use of E-HRM as a decision-making tool in South African universities. A further outcome is a need for universities to invest in a modernised HRIS to improve in the institutions to assist the HR management and quick service delivery process.
H26	Riley et al. (2012)	IS on HRH: A Global Review.	Human resources for health	HRIS is recognised as an integrated health system performance assessment; the baseline information regarding global options and abilities are limited. There are also few documented systems in the use of HRH planning for decision making in some countries that reported the capacity to generate workforce supply and deployment data. Most of those countries experience a crisis in HRH shortages and did not report the data on health worker qualifications and credentials to be captured in HRIS	Literature review	IS on HRH	In the outcome, it shows that HRIS is critical evidence-based HR policy and practices and there is a dearth of information about the effectiveness and current capabilities of the system. A further found that the absence of standardised HRIS profiles limits the understanding and availability of quality information that can be used to support effective HRH strategies and investments at a national, provincial, local, and global level.
H27	Chumo (2014)	HRIS and Staff Development Among International NGO's	Thesis of University of Nairobi, Kenya	The objective of this study was to institute a relationship between HRIS and staff development among the international NGO's. The majority of NGO's implemented HRIS in the HRM functions with a special focus on staff development and the move to prioritise staff development provides a competitive advantage.	Quantitative method	Staff development and HRIS	Recommended outcome: the INGO's should enhance the use of HRIS for staff development, the limitations of the study was reliant on one person in the HRD to respond to HR queries in an NGO, which was a problem that suggests the need to implement an HRIS to allow workers access to do view the response to their HR requests for effective INGO, such advances will require effective staff development / training.
H28	Settle et al. (2014)	Establishing and Using Data Standards in Health Workforce IS	Capacity Plus Intra-Health international, Inc.	Capacity plus is a US AID funded project to assist countries to adapt and implement HRIS to better track and support their health workforce. However, HRIS can only be used for policy and management decisions and is only deemed successful if it can assist to make decisions that will improve healthcare through quality data availability.	Reports analysis	Health workforce IS	The number of health worker records captured in HRIS increased substantially, but the quality checks reveal that many records are duplicated that results in poor data quality and preference of the paper-based records than the system-based records. Cohesive implementation and maintenance of HRIS can reveal various problems through automated reports that identify, compare, and analyse common errors in the data capturing process.
H29	Maruru (2014)	HRIS and Decision Making in the Ministry of Health	Thesis of University of Nairobi, Kenya.	The study was to establish the extent of HRIS usage in the Ministry of Health and identify challenges faced in using HRIS, the study further aims to evaluate the quality of	Quantitative	HRIS in decision making	It was revealed that most of the workers in the Ministry of health believe that HRIS is used for the recruitment process its data quality while others lack confidence that it is a complete system. There is also a

				data that is used in the HRIS and establish the influence of the system in making decisions with regards to policy and planning in the health sector.			concern that the data is not relevant to support the decision process in the health sector caused by the lack of proper IT equipment and skilled personnel to support the system. There is a need for clear interventions to address these challenges and subsequently increase in the system usage and access by the workers in the health sector
H30	Iwu (2013)	Analysis of the Reasons for Staff Turnover amongst Paramedics in South Africa	Journal of Human Eco	The reason for this study is to identify the factors that affect retention amongst paramedics, as well as verify the influence of demographic properties on retention potential among the paramedics.	Job satisfaction scale	Staff turnover among paramedics	The study suggests that the management of paramedics can retain and maintain good relations with their workers by providing a satisfying working environment where these paramedics can perform well and continue being productive. A further study can be conducted to examine the degree of relatedness of paramedics in different South African Provinces within private and public health systems, the proportion of resignations between males and females and the impact of technology utilisation in the sector.
H31	Dlamini (2012)	Impact of Data Quality on Utilisation of Integrated HRIS	Thesis of University of the Western Cape	The purpose of this study is to investigate the impact of HRIS usefulness with the aim of ensuring that organisations involved would realise the benefits of their investments in HRIS as well as the need to achieve improved qualities in data to ensure effective use of HRIS.	Mixed research method	Data quality and use of HRIS	The outcome of the study is that data quality has a positive impact on the use of HRIS and the findings revealed that HRIS was predominantly used for operational/administrative rather than strategic purposes. There is also the impression that the HRIS data is generally perceived to be of poor quality: HR workers prefer to produce accurate data over the quality of the data. An organisation that wants to produce quality data must invest a tremendous amount to have an effective system in place for competitive advantage.
H32	Iwu, Allen-Ile and Ukpere (2012)	Factors of Employee Satisfaction for Retention of Health Professionals in SA	African Journal of Business Management	This study focused on health-related professionals in South Africa, it attempts to understand the factors that affect retention in health as; job insecurity, high levels of health worker absenteeism, and high turnover rates amongst health-related professionals	Quantitative method	Employee satisfaction for retention	Several studies have been conducted concerning employee dissatisfaction within the health care profession. Unfortunately, much of this research focused on doctors and nurses without commensurate attention to other health professionals. The findings reveal the possibility of helping to address the difficulty in retaining skilled health-related professionals.
H33	Matimbwa and Masue (2019)	Usage and Challenges of HRIS in the Tanzanian Public Organizations	Human Resource Management	It was revealed that HRIS has been useful in HRM in Tanzania in recruitment and selection, updating and maintenance of employees' data, generation of HR reports, employees' deductions, direct deposit distributions, career planning, training, and development. The study further identified five challenges that associate with	Systematic literature	Usage of HRIS	Based on the challenges identified, they came up with recommendations to assist in the effective use of HRIS such as government to increase in their budget allocation on IS usage in the public sector for adequate development of skilled health workforce using HRIS. Also, they recommend strengthening and coordination between various departments responsible for HRIS management for speedy information

				HRIS usage are (i) fluctuating financial capability to acquire, update and maintain HRIS, (ii) scarce ICT and HRIS professionals, (iii) scarce coordination of government machinery to perform responsibilities, (iv) unstable internet connectivity and (v) lack of management support.			flow for complete and accurate output and timely update of employees' data.
H34	Matimbwa, Shillingi and Masue (2021)	Effectiveness of HRIS in the Tanzanian Local Government Authorities	Journal of Co-operative and Business Studies (JCBS)	The purpose of the study is to investigate the introduction of HRIS in the LGA to address the challenges faced using manual systems in dealing with employee details and information. Such challenges relate to inaccuracy, incomplete and not updated information. It further examines the influence of users' perspectives on HRIS efficiency in the LGA in terms of information timelines, accuracy, and completeness.	Mixed method	HRIS effectiveness	The outcome of this study shows that user characteristics such as IT skills of HRIS users, commitment, and experience in the use of HRIS, completeness and accuracy of the information, and the timeliness of information captured, also imply the need for frequent training of employees on relevant IT skills, nurturing of HRIS staff and encouragement of sharing experience among the users to be adequately and sustainably considered for effective HRIS in LGAs.
H35	Poisat and Mey (2017)	E-HRM: Enhancing or Entrancing	SA Journal of Human Resource Management	The purpose of this study was to determine the effect of E-HRM and examine the studies that report the relationship between E-HRM and organisational objectives. The fact that E-HRM has the capacity to improve organisational efficiency and influence the role of HR as a strategic partner, the idea of E-HRM leading to improved organisational objective, but the evidence of such achievement is still limited.	qualitative	Enhancing E-HRM	The idea that HRIS goes through the E-HRM platform, assist the HR and management in decision making that links with the achievement of strategic objectives through the production of accurate, on-time and reliable information from the study shows that E-HRM is mostly concerned with costs reduction and efficiency increases in the provision of HR services, rather than improving the strategic objective of HRM.
H36	Scott, Dinginto and Xapile (2015)	Operational Health Service Management in the Role of Information in Decision-making	South African Health Review 2014/2015	In the operational level of health systems, the managers play a vital role in strengthening the health systems at the level of implementation, particularly in the time of an increasing number of decentralised processes in the devolution of HR and quality management at the facility level. There is a limited understanding of the nature of the operations by management using HRIS.	in-depth multi-case study	Health service management using IS	To generate quality information in the health sector of South Africa will require a quality assurance process and national standards of HRIS to capture quality information that will be in line with national core standards for health establishments in South Africa. It was revealed that the data on leave allowance is supposed to manage absenteeism. However, the information remains unreliable which undermines the ability of facility managers to manage absenteeism in their facilities. With an advanced HRIS, it could assist to align with the current needs of healthcare sectors to strengthen the HR management for service delivery.
H37	de Vries, Settle and McQuide (2009)	Impact of HRIS Strengthening	Capacity Project knowledge sharing	This study shows that most LMIC relies on a paper-based or simple electronic spreadsheet that is not linked	qualitative	Impact of HRIS	The most efficient and reliable way to track changes in the health workforce is to implement an HRIS routine, computerised HIS that

				to any departments and creates an incomplete file and tracking system; this becomes a barrier rather than a contributor to better health outcomes. The problems with data quality include duplication and inconsistencies, hard to identify and correct data for meaningful analysis and time-consuming process of capturing and retrieval of data.			gathers data which consists of software's used to enter and update information into a bigger database HRIS for a proper report and analysis tools. The capacity project was developed to assist in strengthening the process of workforce planning and management software's to be used by Ministries of Health, professional councils/boards, and other similar institutions. (Flowchart of the HRIS Strengthening Process).
H38	Alam et al. (2016)	Critical Factors Influencing Decision to Adopt HRIS in Hospitals	PLoS ONE	This study combines two adoption theories such as HOT-fit model and TOE framework, and came up with 5 factors that are critical to HRIS adoption such as IT infrastructure, top management support, IT capabilities of staff, perceived cost, and competitive pressure.	Quantitative	Decisions to adopt HRIS	The outcome of the study was significant to the technological element that is followed by organisational, human, and environmental elements. The study also highlights constructive proposals to researchers in hospitals and other government sectors to augment the likelihood of HRIS adoption. Currently, the study has implications in understanding HRIS adoption in the developing countries health system.
H39	Mohammed (2021)	Role of HRIS in Achieving Organizational Excellence: A Study in a Private Hospitals	The Scientific Journal of Cihan Universit / Sulaimani ya	The study focuses on the need for increased participation in the process of change and on the issue of intensive discussion which might be more productive. Holistic concepts are needed in terms of the relationship between HRM and organisational excellence among staff members in the private hospitals	quantitative method	HRIS and organisational excellence	In need of greater concepts on employee welfare and increased efficiency of hospital staff to be in line with technological development. Also, the study recommends hospitals management necessarily avail the HRIS effectiveness if they want to adapt to changes more rapidly and to make decisions that are needed to enable them to combine service delivery with excellence in the health sector.
H40	Tursunbayeva et al. (2017)	HRIS in healthcare: systematic evidence review	American Medical Informatics Association	The research goals are (i) determine the dominance and scope of existing research on HRIS in healthcare, (ii) Analyse, classify, and synthesize evidence on the impacts and processes of HRIS development, implementation, and adoption; and (iii) generate recommendations for HRIS research, policies, and practices in healthcare.	Systematic Literature	HRIS in healthcare	Studies in HRIS in healthcare do exist in the research world, but there is a lack of unanswered questions about the capacity to improve quality and efficiency in the health system. There is also the issue of socioeconomic and technical complexity that influence the implementation and effectiveness of HRIS. The study offers an analysis of decisions and managers to consider the current implementation of HRIS and make a recommendation for future research.
H41	Matsiko (2019)	HRIS and Recruitment Process in Ministry of Health, Uganda	Thesis of Management Institute	This study reveals that in the use of HRIS, e-advertising has a negative relationship with the recruitment process in the Ministry of health; e-application and e-interview have a significant relationship with the recruitment process. The study also concluded that strategies for e-advertising could have a negative impact on the recruitment process in	Mixed method.	HRIS and recruitment process	It was revealed that the management of the Ministry of health need to revise their policies on HRM in the use of HRIS to incorporate the new trends (e-application and e-interviewing) that is brought with the technological advancement

				such a way that suitable applicant can miss out. Also, the fact that the Ministry of Health have committed less investment which has a negative impact on the e-application system			
H42	Butt (2020)	Development and validation of HRIS Implementation Scale	Thesis of University of Malaysia	In this study, it was found that IT proficiency, IT structure, financial willingness and top management support have a positive effect on the adoption of HRIS, also HR practices and competitive advantage does not influence HRIS implementation	Mixed method	HRIS implementation scale	The outcome of the study is the development of an HRIS implementation scale that can be used by researchers to examine the relationship that exists with other relevant factors as identified by the TOE framework which can affect HRIS implementation in organisations
H43	Maduagwu and Ugwu (2018)	HRIS and Organisational Effectiveness	Asia Pacific Journal of Research in Business Management	This study shows that organisations that want to be effective must have a platform for proper integration of HRIS into the mainstream of their formulated strategy. HRD deals with the strategy that concerns the workforce and the programme implementation which adds to the effectiveness of organisations.	Quantitative	Effective HRIS	The study recommended that HRIS can contribute to enhanced productivity of employees that make use of the system, especially those in the HR and IT unit. They should then be trained regularly on the relevant data and skills to deal with the changes in the organisation and environment as well as the costs involved with the maintenance structure in the system. Such costs need to be properly controlled to ensure that it does not deviate from the competitiveness of the organisation.
H44	Chukwu (2017)	Current Situation of Children's Nursing Training in South Africa	Thesis of University of Cape Town	This study shows that there are literatures studies that indicate that the high rate of mortality in the South African health sector can be prevented by strengthening the use of HRIS to identify and improve the training of young nurses to ensure their competencies are adequately aligned with the health needs of the young and upcoming nurses in the sector.	Mixed methods	Nursing curriculum / training of young nurses	It was revealed from the study that a supply of young nurses is still needed especially those trained in specialised health fields and practices. There is also the need to review and strengthen the nurses' curriculum to make it a priority to improve the young nursing education and a way to have such upskilled captured in HRIS of the South African health sector.
H45	Eboreime et al. (2017)	Evaluating the Sub-National Fidelity of National Initiatives in Decentralized Health Systems	BMC Health Services Research	This study explores the implementation of integrated primary healthcare policy in a decentralised governance system and the implication of closing the implementation gap concerning other forms of health policy initiatives. It was also realised that no state in the country of the study was compliant with HRM and funding requirements to improve in their HRIS functionalities	scorecard approach	Decentralised health system	It was recommended that the importance of evaluating and providing evidence of implementation gaps towards the improvement of policy evaluation, particularly in a decentralised healthcare setting. This study will help the national government in their policy to identify more effective ways of supporting the lower level of government to improve their HRIS for effective health systems and outcomes
H46	Chakraborty and Khan (2019)	Case Study on the Importance of HRIS in the Healthcare Sector	American Journal of Public Health	This study shows that the case of an emerging economy where the need to reach out to the health sector is a great challenge; the health sector ought to leverage technology to the fullest to optimise the	Case study review	Importance of HRIS	The research in HRIS in healthcare was interdisciplinary and a theoretical study was conducted in the healthcare of High-Income Countries (HIC) where there are high focuses on the benefits of HRIS. The case study analysed the

				usage of human capital as an important element.			consequence of HRIS presence in selected hospitals in HIC, concluding that in not realizing the true potential on the use of talent towards better output in an emerging economy through the use of HRIS
H47	Afriyie, Nyoni and Ahmat (2019)	State of Strategic Plans for the Health Workforce in Africa	BMJ Global Health	The study assessed the extent to which the strategic plans developed by countries conformed to the WHO roadmap, also examined the strategic plans for HRH in sub-Saharan African Countries.	Quantitative	Strategic plans of health workforce	The study realised that most countries in the sub-Saharan African countries did not meet the national health strategic action plans for the HRH, also did not utilise the set-out plans to address the selected areas of the roadmap in the health sector. Despite the efforts, countries need further support to comprehensively implement the selected strategic areas to maintain the required health workforce to achieve universal health coverage.
H48	Nyoni and Gedik (2012)	Workforce Governance and Leadership in the African Region: Review of HRH Units in the Ministries of Health	Human Resources for Health Observer	The study revealed that the challenge faced by the health sector is governance capacity, where most of the countries had policies and plans in place but only a few were implemented. Also, few of the countries had incorporated monitoring and evaluation measures in place. The result further implied that the major obstacles were the governance capacities and insufficient investment of effort and finance.	Review by the WHO	Health workforce governance	It was realised that many of these countries do not have sufficient capacity to ensure the availability and management of an effective and sustainable health workforce that can provide the expected health services to the Ministry of health for the strategic and operational level of the services.
H49	Ilorah, Ditsa and Mokwena (2017)	Readiness Assessment Framework for Implementation of Mobile e-Healthcare in Rural South Africa	International Journal of Health and Economic Development	This study reveals that e-health does not solve all the problems in rural communities and geographical barriers. E-health is supposed to assist in rural areas with electricity and other infrastructural e-health support. The study was also able to identify e-healthcare readiness assessment factors in literature and to use the information to develop a mobile e-health readiness framework for implementation in the rural area of South African health facilities.	Literature study	Framework for mobile e-health	The study revealed that healthcare is the biggest service sector in South Africa, yet the full potential of the e-services revolution in the form of e-health are still limited and face several challenges. There is a notion that mobile e-health removes the restrictions imposed by infrastructural challenges, such as under services population, rural geographic locations, wireless connections and enabling patients and workers to benefit from increased mobility provided by the e-healthcare.
H50	WHO (2013)	Road Map for Scaling Up the HRH: Improved Health Service Delivery in the African Region	World Health Organization	The provincial health system in Africa has limited infrastructure that led to insufficient coverage of essential health services. Countries efforts to ensure adequate HRH are subjected to inadequate capacity of HRM, low HRH delivery, low level of skills improvement, slow pace of education reform, poor	Report	Scaling up HRH 2012-2025	It was revealed that the road map was endorsed by the Regional Committee for Africa on the collective effort of the WHO and member states, to strengthen the capacity of the health workforce for improved health service delivery in the African region. The primary target audiences are government leaders and the national level of decision-makers in the health service in Africa.

				incentives, and poor retention strategies.			
H51	Kemei (2016)	Influence of HRIS Utilization on Employee Performance in Private Parastatals	Thesis of United States International University	The study realised that the information generated from the self-service system of HRIS has increased the flexibility and improve their performance. The information generated has assisted in strategic decisions which in turn improved employees' performance. It also increases their ability to disseminate information.	Quantitative	HRIS utilisation	The study revealed that HRIS should be optimised to improve employee performance; they should also invest more in record-keeping to manage the data of employees and equip managers to make a strategic decision. More time should be invested in the adoption of a system that translates to fulfil the organisational requirement that will lead to the commitment of employees towards organisational goals.
H52	Okwang (2020)	HRIS Technology Effects on a State parastatals Human Resources Leadership	Thesis of St. Thomas University	The purpose of the current study, therefore, is to research and explore the impact of HRIS on managerial personnel in a public state university setting through the utilization of a case study research model.	Qualitative	Technology effects of HRIS	The research investigation produced five wide-ranging themes, detailed as follows: (1) reliable HRIS data drives organizational communication and development, (2) paper-based and other traditional data tracking methods back HRIS, (3) ongoing HRIS technology training is essential to HR leader development, (4) public state university recruitment is challenging, but it is enhanced by HRIS technology, and (5) Suggestions on the way forward for public state university HRIS advancement.
H53	Zafar, Randolph and Martin (2017)	Toward a More Secure HRIS	Transaction Human Computer Interaction	The need to ensure the security of HRIS from unintentional mistakes that may compromise information's, the current design, and procedures of HRIS is unintentionally assisted to reinforce insecure behaviours that result in the non-malicious security interruptions. The need to improve the security of information through design and training can occur by breaking the cycle that employees have formulated.	Literature study	Secure HRIS	The study revealed that security, education, training, and awareness programme that were implemented by the organisation, contend that most unintentional mistakes result from habitual behaviour that promotes frequent response and previous research agrees that frequent behaviour does result in the force of habit that can create an outcome of unsecured information. The study provides a framework that can be used in future to investigate the role of unconscious habits that may occur in the security of HRIS.
H54	Tetteh (2014)	Framework of IS Implementation in the Health Sector in Sub-Saharan Africa	Journal of Health Informatics in Developing Countries	This study is about the reference and theoretical framework of information systems implementation in the health sector in sub-Saharan African countries. Variance framework is employed to scrutinise theories of reference that are employed to conduct an information system implementation in the health sector of the region.	Literature study	IS implementation in health	The articles were mapped out in process variance framework, which the findings signify a critical review of large portions of the study were supported by variance/factor of theories that are useful and appropriate for investigation of the static phenomenon. There is also a need to increase the research that employs the process of a theoretical framework to enhance our insight into successful information systems implementation in the region
H55	WHO (2010)	Report of the First Meeting on Health	World health Organisation	The study aimed to initiate a discussion on how to promote a coordinated and standardised approach to strengthen African countries	Report	Health workforce information	The results emanated from discussions and presentations that were used to reach an agreement on the terms of reference of the health sector of the African countries and

		Workforce Information		health workforce information and monitoring systems to support effective planning and policies in research.			their members, also agree to an action plan for the workforce in the respected countries. Due to the increase in demand for global HRH data and information, the African countries are seen to have an advocacy role among data producers and the users for effective knowledge functioning.
H56	Marful and Winter (2014)	When IT Meets Healthcare in West Africa: A Literature Review	Health Informatics in Africa Conference	This study presents an analysis of some research articles that were selected according to their potential contribution to the implementation of information technology (IT) in the health sector of West Africa.	Literature Review	IT in Healthcare	The study revealed that (IT) has a brighter future for the healthcare management, practitioners and the entire health sector of West Africa if all the identified challenges such as politically, socially or economically are eliminated in the sector.
H57	Ruël and Bondarouk (2018)	Intersection Between IT and HRM from a Cross-national Perspective	Handbook of Research on Comparative HRM: 2 nd Edition	This study highlights that investment has been made in e-HRM by various organisations, but the use of online recruitment practices such as e-recruitment, the automation of HRM administrative complete processes and the implementation of competence HR management-based packages to link with HRM policies and practices for strategic goals are still limited.	Book chapter	IT and HRM	This study is relatively new, innovative, substantial development in HRM phenomenon, and a major change in the research environment, although researchers have worked so hard to understand the phenomenon of e-HRM and its level of implication to e-recruitment and automation of systems within and across organisations.
H58	Zakumumpa et al. (2016)	HRH strategies adopted by providers in resource-limited settings to sustain long-term delivery	Human Resources for Health	HRH restrictions are major barriers to sustainability to scale-up programmes in sub-Saharan African countries, more prior approaches to HRH restrictions have taken a generalised global policy and strategic guidelines approach. The objective of the study was to scrutinise the HRH strategies adopted by the health sector for sustainable goals.	mixed-methods approach	HRH strategies	In the result, they identified several strategies to be accomplished in the adoption of efficient resources for HRH are (i) provides financial and non-financial incentives to health workers, (ii) workload reduction through spacing clinic appointments, (iii) adoption of training workshops, (iv) management support as motivation strategy to workers, (v) adoption of non-physicians staffing models, (vi) devising program leadership styles that enhance health worker commitment.
H59	Juma (2018)	Influence of HRIS on Employee Commitment in Nairobi	Thesis of University of Nairobi, Kenya	The study realised that there was no significant influence of HRIS on employees' commitment in a manufacturing organisation; also, they have not incorporated the use of HRIS to the extent of making it easy to analyse and influence the system for employee commitment purposes.	Quantitative	HRIS on employee commitment	The study revealed the use of HRIS assist organisations to improve in efficiency, promote HRP and development and improve in performance commitment if effectively utilised.
H60	Barišić, Pejić Bach and Miloloža (2018)	HRIS: Transactional and Strategic Paradigm	Proceedings of the Entrepreneurial Enterprise Research	HRIS is an unpredictable component of modern organisations setup, the system provides multiple HRM services from an administrative setting of	Literature study	Strategic HRIS	This study is aimed to contribute to better utilization of HRIS usage in organisations and analysing various approaches in terms of purposive and validity of implementation of HRIS with the main goal of

			Innovation	collecting storing and executing data processes in the HRM environment. It also involves the provision of information to management in enabling them to make quality HR strategic decisions.			maximising the impact on organisational performance. The goal of this paper is to provide an overview of the HRIS administrative and strategic paradigm and evaluate its impact on organisational performance.
H61	Barišić, Poór and Bach (2019)	Intensity of HRIS Usage and Organizational Performance	Interdisciplinary Description of Complex Systems	HRIS is widely used in various organisations; previous studies investigated the impact of HRIS on organisational performance but on the level of adoption perspective, this study focuses on the intensity of HRIS usage in organisations and their impact on performance.	Literature study	HRIS usage	The study developed several regression models using datasets with big companies, research results revealed that the strongest impact on organisational performance is attained through the intensity of HRIS usage, the number of different functionalities available in the HRIS. It could also be the result of the overall development of management and its impact on organisational performance.
H62	Naimoli et al. (2015)	Strategic Partnering to Improve Community Health Worker Programming and Performance	Human Resources for Health	The study came up with a proven strategy to enhance and sustain CHW performance, however, the stakeholders need guidance and new idea which will emerge from the recognition and functions at the intersection of the system's dynamics. The formal health systems and y typically supports CHW and their support is not necessarily strategic, collaborative or coordinated.	Literature review	Community health worker programme	The study revealed that CHW performance benefits result in the implementation through four strategies which include (i) joint ownership and design of CHW programmes, (ii) collaborative supervision and constructive feedback, (iii) a balanced package of incentives, and (iv) a practical monitoring system incorporating data from communities and the health system.
H63	Otieno (2016)	Influence of HRIS on organisational Performance	Thesis of United States International University - Africa	The study determines the extent to which ESS influence organisational performance, investigate how access to HRIS influence organisational performance and determine how MSS influence organisational performance.	Quantitative	Influence of HRIS	The study recommends that Africa should invest in the use of ESS to experience increased productivity. Also, management should support the use of MSS in improving organisational performance; engage the employees in the analysis, design, construction and development of the HRIS. Also, train employees on how to use HRIS to improve their performance.
H64	Alhazemi (2017)	Critical Analysis and Current Challenges Facing HRIS Adoption	International Journal of Heritage, Tourism and Hospitality	The centralised HRD attempt to monitor the performance of employees across geographical borders that attempt to provide services to employees using a centralised system, it helps to standardise the HR practices and to reduce the costs associated with maintaining multiple HR departments. HRIS help to accomplish these difficult tasks of centralised HRD more efficiently.	Literature review	HRIS Challenges	HRIS has become a common system even among small organisations, even though there has been an increasing awareness among organisations in developing countries about the potential benefits of HRIS, there are some issues that involve organisations making decisions to adopt HRIS as well as the implementation process.
H65	Obeidat (2012)	Relationship Between Innovation Diffusion and HRIS	International Cross-Industry Journal	The reason for this study is to investigate the relationship between innovation diffusion and HRIS, the theoretical framework of the study was	Quantitative	Innovation diffusion and HRIS	It was realised that there is a positive relationship between innovation diffusion and HRIS, especially where it was found that a relationship exists between relative

				based on literature discussion on innovation and HRIS where innovation was the independent variable and HRIS was the dependent variable.			advantage, compatibility, trialability and observability and HRIS functionalities on the other hand. It also indicates no relationship that exists between complexity as a dimension of innovation and HRIS functionalities.
H66	Pouransari, Al-Karaghoul and Dey (2016)	Role of HRIS on Staff Retention	AMCIS 2016: Surfing the IT Innovation Wave	There is limited research on the application of quality HRIS in staff retention management, this study shows an application of HRIS in staff retention in the health sector by the adoption of institutional theory and job characteristics theory.	Literature	HRIS and staff retention	The focus of this study was on the activities of the organisations at the early stage of the recruitment and selection process, adoption of an institutional theory provides a perspective to internal and external staff turnover such as remuneration, training quality and lack of growth opportunities, that are before recruiting of an employee in an organisation.
H67	Davarpanah and Mohamed (2020)	HRIS Implementation and Influences in Higher Education	Journal of Asian Business and Information Management	This research was able to develop and at the same time test a theoretical model on the implementation and influence of HRIS in an institution, of which the data was gathered among 103 respondents through survey method.	Quantitative	HRIS implementation	The results show that the system is affected by factors such as information quality, institution-based trust, situational normality and structural assurance and contribution to user satisfaction. User satisfaction and situational normality do predict HRIS perceived benefits. The findings assist the researchers to explain perceived benefits and satisfaction with HRIS in institutions.
H68	Muinga et al. (2018)	Implementing an Open Source Electronic Health Record System in Kenyan Healthcare Facilities	JMIR Medical Informatics	The Kenyan government, working with international partners and local organizations, has developed an eHealth strategy, specified standards, and guidelines for electronic health record adoption in public hospitals and implemented two major health information technology projects; (i) District Health Information Software Version 2, for collating national health care indicators and a rollout of the Kenya EMR and (ii) International Quality Care Health Management Information Systems, for managing 600 HIV clinics (patients and workforce) across the country.	Review of existing literature on eHealth	Electronic health record system	The implementation process included upgrading the hospital information technology infrastructure, training users, and attempting to gain administrative and clinical services in the adoption of the system. The initial arrangement was ultimately scaled back due to a complex mix of sociotechnical and administrative issues. Learning from these early challenges, the system is in the process of being redesigned and prepared for deployment in the health system.
H69	Muinga et al. (2020)	Digital Health Systems in Kenyan Public Hospitals	BMC Medical Informatics and Decision Making	As healthcare facilities in LMIC adopt DHS to improve in administrative and patient care, it is important to recognise the adoption process and assess the systems' capabilities. This study aims to provide decision-makers with information on the DHS setting and to support the rapid development of digital health in communities in	Literature	Digital health systems	Public hospitals are increasingly acquiring IS to support administrative functions and this study highlights challenges faced by hospital users such as system usability, inadequate training, infrastructure and system support. Vendors reported the lack of availability of a wide range of modules, but implementation was affected by funding, prioritisation of services, users' lack of confidence in new technologies and lack of appropriate data sharing policies.

				Kenya and the region by sharing knowledge.			Significant work is required to ensure interoperability of systems within hospitals and with other government services.
H70	Makembo and Oluoch (2018)	Effect of HRIS on the Quality of HR Functions	International Journal of Social Sciences and Information Technology	HRIS was primarily seen as MIS sub-functions within HR areas projected to support the “planning, administration, decision making, and control activities of HRM. The objective of this study was to assess the effect of HRIS on the quality of HRM function among organisations in Kenya.	Mixed method	HRIS on HR functions	It was found that the e-recruitment process helps in building and developing a flexible workforce to suit the organisational change and demanding needs. Therefore, the research recommends that organisations should adjust their duration of practising e-training to their employees to build up their confidence in their job.
H71	Afrizal et al. (2019)	Barriers and Challenges to Primary Health Care Information System (PHCIS)	Informatics in Medicine Unlocked	We evaluated the implementation of the PHCIS to explore and describe the barriers and challenges during the adoption of Primary Health Care (PHC) from a health management perspective and propose a PHCIS design to minimise the barriers.	Qualitative	Primary health care system	The study revealed that 4 themes of the barriers were identified from a strategic and operational level perspective such as human resources, infrastructure, organisational support, and processing factors. The recommendations include strengthening staff competency, improving technology infrastructure, increasing organisational support with more investment on PHCIS, and re-designing the PHCIS to accommodate the basic process of the health system, might be beneficial to improve PHCIS adoption.
H72	Aletaibi (2016)	Analysis of the Adoption and Use of HRIS in the Public Universities	Thesis of Coventry University	Due to the weaknesses of other HRIS success models in a tertiary environment, this study integrates some obligatory factors into the DeLone and McLean HRIS success model to develop a new model that provides a comprehensive perception into the most important factors affecting the issue of HRIS within the HR Departments of universities.	mixed-method research	Adoption and use of HRIS	The results show that six factors affected the use of HRIS in the HR Departments of public universities known as: usefulness, a speedier decision-making process, system quality, ease of use, subjective norms (social and peer pressures), and the unification of systems. The study was performed to identify the factors and map the strength of the relationship with the use of HRIS, user satisfaction and HRIS adoption.
H73	Singh and Tagiya (2017)	Role of HRIS in Improving Tourism	Management Insight - The Journal of Incisive Analysers	HRIS is known to enhance the competence of HR and facilitating it by automation, objectivity, reliability, accuracy, and responsiveness. This study shows that efforts are laid to establish an improvement in the tourism sector is important to improve the current HR practices through an effective HRIS.	Conceptual study	Role of HRIS	The study revealed a triangular structure, where HRM has a direct influence on the tourism sector, and at the same time, HRIS has a positive impact on HRM. Consequently, it is established that HRIS will play a direct role in improving the huge tourism potential in the countries of study.
H74	Lukaszewski, Stone and Johnson (2016)	Impact of HRIS Policies on Privacy	Transactions on Human Computer Interaction	This study was able to (i) examine the effects of three HRIS policies on employee’ perceptions of invasion of privacy (ii) assess the controlling effects of work experience concerning HRIS	Experimental design	Impact of HRIS	The results revealed that individuals perceived HRIS as more of an invasion of privacy when HRIS data were used for only the benefit of the organisation than when it was used to benefit employees. In addition, the results indicate that individuals

				policies and employee' perceptions on invasion of privacy and (iii) discuss the implications of these findings for developing fair information policies.			perceived that HRIS was more invasive of privacy when the data were accessed by supervisors than when they were accessed by the HRD.
H75	Iwu (2014)	Rethinking Issues of Migration and Brain Drain of Health-Related Professionals	Mediterranean Journal of Social Sciences	The intention of this study was not to particularly engage issues of health workforce, brain drain and migration, but to reveal some of the fundamentals that can motivate and retain health-related professionals in South Africa. The data was collected using the plus delta questionnaire which fits with the study and it also contains both job satisfaction and organisational climate elements.	Quantitative	Migration and brain drain in health	The study identified several factors that influence employee satisfaction within the health-related professions of South Africa, such factors include role clarification and Job design; reasonable performance management; unified leadership and knowledge sharing; self-efficacy; friendly work environments; leadership credibility; innovation; exceptional client relations and effective technology in place. This study concludes by suggesting that these factors should be present in organisations to reduce brain drain and migration of South African health professionals.
H76	Udekwe et al. (2021)	Descriptive Literature of HRIS in health sector	Research in Business & Social Science IJRBS	This study was conducted to review the adoption of HRIS in the health sector owing to the lack of effective use of the benefits of such service delivery in the sector. The fact that the adoption of HRIS is problematic because of the low level of trust in the use of technology in the health sector.	Descriptive literature	HRIS Adoption in health	This study reveals low research on HRIS adoption in the health of South Africa was conducted and the fact that the sector does not regard HRIS as a critical IS to use in managing the workforce. There is a need for more emphasis to be placed on the adoption of HRIS through investments, upgrades, and continuous research to support the system.