

The Significance of Knowledge Management in Improving the Quality of Health Care in the Public Sector in Zimbabwe

Frank Chikhata* Orpah Onwards Chivivi

Department of Business Management, Midlands State University, Private Bag 9055, Gweru, Zimbabwe

Abstract

The research aims to look at the significance of knowledge management in improving the quality of healthcare in the public health facilities. The research looks at the effect of knowledge management process on reducing new-born mortality, improving retention of patients on ART in health facilities and whether the use of information technology and availability of adequate human capital improves the number of pregnant women booking for antenatal care (ANC) and access to child immunisation. Knowledge management in health care is relatively new and this research provides empirical evidence of the relationship between knowledge management and the quality of healthcare measured by: new-born mortality, retention of women in ANC, retention of patients on ART, and access to immunisation by children. Data was collected through questionnaires distributed to randomly selected nurses in selected health facilities. The number of nurses selected was proportionately distributed across the seven districts in Manicaland based on the total number of nurses per district. Data analysis revealed that there is evidence of knowledge management practices in health facilities. However, the results show that knowledge management does not have an impact on reducing mortality of new-born babies and information technology does not have an effect on the retention of pregnant women on ANC. When it comes to making sure that the HIV positive patients remain on ART, the results show that the knowledge management process affects the retention of patients on ART. Human capital has an impact on access to immunisation by children. These findings show that healthcare is a complex field where knowledge management implementation can affect some of the components of the healthcare and not all of them as the different components of the healthcare are managed differently. An effective knowledge management system should address the acquisition, sharing and utilisation of knowledge within the health sector.

Keywords: Knowledge Management, healthcare, health facilities, quality

1. INTRODUCTION AND BACKGROUND OF THE STUDY

There has been a growing interest in knowledge management during the past twenty years; knowledge has been regarded as an important source of competitive advantage (Karma, 2006; Petruzzelli, 2008). Many businesses have adopted knowledge management practices but the healthcare industry has been sluggish in adopting such knowledge management concepts and principles (Eysenbach, 2001). As such, the adoption of knowledge management in the health sector has been challenging but the provision of health services without concern for quality is not professional and actually deadly (Adindu, 2010). Research by Dwivedi et al. (2005) highlighted the fact that the knowledge management model in healthcare has been fairly recent and there are limited studies to provide empirical evidence for academic and organizational stakeholders in the health sector. Relatively few studies have focused on the impact of knowledge management on the quality of health care especially in developing countries such as Zimbabwe.

There is a general consensus among authors that not much has been written on healthcare knowledge management in regard to adoption and implementation (Wickramasinghe and Geisler, 2007). While knowledge management is being considered as a means to support efficiencies and reduce costs, little has been reported on how technology, knowledge management processes coupled with human factors might support the clinical decision making process (Simon, 2016) and ensure that the quality of health care is improved in the process.

Studies by Chen and Huang (2009) and Fugate et al. (2008) noted that there is a positive impact of how knowledge management can promote operational and organisational performances. Nevertheless, the adoption and institutionalisation of knowledge management in the health care has been challenging.

The Zimbabwean Ministry of Health and Child Care's (MoHCC) main mandate is to promote the health of the people in the country through ensuring that there is effective health delivery system and provide access to quality health services. There have been several challenges in promoting the delivery of quality health services to the general populace in the country and some of these challenges included lack of appropriate knowledge and skills, lack of appropriate technology, and lack of adequate human resource.

Zimbabwe has been lagging behind in adopting the electronic medical records especially in the public health sector. They still rely on paper-based record system when dealing with patient data; printed registers and patient record forms are the core sources of data collection tools in most public health institutions. There is no evidence to suggest lack of electronic medical records as a hindrance to provision of quality healthcare.

In Zimbabwe, the Ministry of Health and Child Care (MoHCC) developed a Quality Improvement (QI) and Quality Assurance (QA) Policy and Strategy in 2013 and 2014 respectively after the realisation of the need

to promote and improve the quality of care. A department within the MoHCC head office was also set up to spearhead the quality improvement Agenda. This is a reflection of how serious the quality of care issues have been taken by elevating them to Strategic issues within the MoHCC. The QI/QA policy and strategy looked at challenges imposed by lack of suitable technology, human resources (people) in improving the quality of care in public health delivery sector. Prior to the development of the QI and QA policy, the Zimbabwe MoHCC commissioned a National Integrated Health Facility Assessment (NIHFA) in 2012 with the aim to ascertain the level of quality of care offered by health workers in the public health institutions. The study revealed glaring gaps in the quality of healthcare where 86% of the health workers could not meet standards to identify danger signs during pregnancy (MoHCC, 2012). This study did not look at the factors that affected the low level of quality of care and the current research is handy in ascertaining the impact of KM to the provision of quality healthcare. What is not known from the NIHFA is whether the level of motivation of the health workers, technology and KM processes have any effect on the quality of care provided as it was a descriptive study. In 2012, the MoHCC piloted and rolled out an electronic and web based health management information system (HMIS) as a way to promote sharing of explicit knowledge in the health sector.

1.1 Objectives of the paper

- To assess the impact of knowledge management on reducing mortality of new-born babies in the health facilities.
- To determine the impact of using information technology on the retention of pregnant women on antenatal care in health facilities.
- To analyse the correlation between knowledge management process and retention of patients on antiretroviral therapy (ART) in health facilities.
- To evaluate the impact of human capital on access to immunisation by children aged less than 1 year in health facilities.

The paper presents literature review, definition of KM, types of KM, KM concepts, KM factors, methodology, results discussion, conclusions and recommendations.

2. LITERATURE REVIEW

2.1 Definition of Knowledge Management

Rastogi (2000) defined knowledge management as a logical process of harmonising organizational actions of obtaining, archiving, and disseminating knowledge by individuals and teams in an effort to accomplish key organizational goals and objectives. The purpose of knowledge management is to safeguard and cultivate knowledge possessed by individuals (Brooking 1999).

2.2 Types of Knowledge

2.2.1 Tacit knowledge

It is composed of knowledge that is in-built within individuals; it is challenging to define and it comes from experience and study (Nonaka 1994). Tacit knowledge is usually dependent on the context and very personal in nature. It is difficult to converse and it is engrained in action, commitment, and participation (Nonaka 1994).

Many researchers and authors regard tacit knowledge as the greatest valued source of knowledge, and the one that mostly leads to innovations and discoveries in organizations (Wellman 2009). According to Gamble & Blackwell (2001) the absence of attention on tacit knowledge leads to the reduction in competence for innovation and competitive advantage.

Blair (2002) noted that knowledge is created and nurtured through collaborative effort with other people and institutions. Tacit knowledge develops as a result of experimenting and experiencing successes and failures. Ariarte (2008) argued that tacit knowledge, therefore, is dependent on the context. As such, it may be difficult to ensure that it is formalised or articulated. Subsequently, tacit knowledge is extremely personalised, the extent and ability by which it can be shared depends to greatly on the capability and the will of the person owning it to transfer it to other people (Ariarte, 2008). Many organisations find it difficult to share tacit knowledge. Tacit knowledge can also be shared through apprenticeship, storytelling, and communities (Mládková, 2012).

2.2.2 Explicit knowledge

This refers to knowledge that is codified (Zollo & Winter, 2001) and organised (Nonaka, 1994). It can be readily made accessible to other people and communicated or disseminated in the form of systematic and official languages (Denning, 2002). Explicit knowledge encompasses everything that can be documented and stored for future reference and use including reports, memorandums, minutes, business plans, copyrights, logos, and approaches, among others (Abell and Oxbrow, 2001). In many organizations, the use of computers and information technology helps to store these knowledge assets.

2.3 Healthcare Knowledge Management

Mahmood, Burney, Abbas and Rizwan (2012) as quoted by Simon (2016) indicated that the healthcare industry is a knowledge centred community and is linked to hospitals, physicians, patients, laboratories, pharmaceuticals, clinics, and; clients and patients for sharing knowledge. The healthcare organisations differ from organisations in other industries as postulated by Ali, Tretiakov and Whiddett (2014). The medical knowledge constantly evolves (Ali, Tretiakov, and Whiddett, 2014). Liu, Cheng, Chao and Tseng, (2012; 408) as quoted by Simon (2016) opined that the main challenge for healthcare is the transition of knowledge management into practice. Consequently, part of an overall knowledge management strategy in healthcare should be to incentivise information sharing behaviour (Sylla, Robinson, Raney and Seck, 2012).

As noted by Glaser and Overhage (2013), knowledge transfer and management has become strategic in healthcare; there are different ways of transferring knowledge such as use of e-learning initiatives and communities of practice to mention but a few. Simon (2016) postulated that there have been great improvements in knowledge management in the healthcare but much work still remains to be completed. In support of this, Gagnon et al. (2015) highlighted that it is important for the healthcare organisations to look for innovative solutions and to develop strategies that are aimed at designing new work practices and to management knowledge. This was also echoed by Lee and Hong (2014) who postulated that hospital organisations should build and develop knowledge through motivating the employees to share the knowledge and continually foster innovation.

Despite the fact that there has been some effort to blend significant ideas of knowledge management into the healthcare literatures (Davies and Nutley 2000, Nutley et al 2004, Nicolini, et al. 2008), there has been marginal integration of these concepts into the knowledge transformation or exchange paradigm in healthcare organisations. Actually, knowledge management has continued to grow as an effective strategy for firm performance, but there is limited empirical research that explored the association between knowledge management and the quality of services offered in the health sector.

Edmondson (2004) argued that, there are a limited number of healthcare organizations that have adopted and adapted knowledge management concepts. In Zimbabwe, a number of partner organisations have been supporting knowledge management initiatives in the health sector with the aim of making sure that the quality of health care services is made better and acceptable. The Maternal and Child Health Integrated Programme (MCHIP) supported the MOHCC in Manicaland to revive the maternal and perinatal mortality audits. The mortality audits act as knowledge sharing platforms where reviews are made on what could have caused the deaths and what can be done in future to prevent similar deaths. This is in line with Lee and Hong (2014) who articulated the need to build and develop knowledge in healthcare organisations through motivating the employees' knowledge sharing and continually fostering innovation in the organisation.

2.4 Knowledge Management Concepts

2.4.1 Knowledge Acquisition and Creation

Choo & Bontis (2002) and Lawson (2003) define the knowledge acquisition and creation as the enhanced utilization of available knowledge and the development of new knowledge by using discussion. Additionally, Allee (2003) affirms that acquiring and creating knowledge with the organizations involves linking the organization knowledge to the organization's purpose, mission, vision, and core values and ensuring that there is sharing of personal experience and skills. The organization should ensure that knowledge is acquired as it forms the basis of knowledge management.

2.4.2 Knowledge Capture and Storage

Knowledge capture and storage are methods of recognising new knowledge as applicable and essential for present and future utilization, ensuring that that unit of knowledge is stored in rational formats so as it can be accessed by others within the organization (Lawson, 2003; Zack, 2003). In view of this, knowledge capture and storage is vital when knowledge is generated (Hung, et al, 2006). Assessment of the contributions of these writers and scholars reveal that generally, organizations have to ensure that new knowledge is created, used and stored. The organizations should also ensure that the knowledge is shared by organizational members in order to improve their performance and aid in value creation.

2.4.3 Knowledge Sharing and Transfer

As postulated by Bock & Kim (2002) knowledge sharing is important in knowledge management process. Furthermore, Bock and Kim (2002) affirmed that knowledge sharing and knowledge transfer frequently are used interchangeably. Knowledge sharing and transfer refer to the business processes that distribute and convey knowledge among individual workers or teams contributing in activities within or across organizations (Frappalo, 2006). Supporting the above opinion Ribiere (2001) indicated that during sharing and the process of transfer the knowledge have to be accessible in suitable and correct forms, making it comprehensible and that it can be easily interpreted by the other individuals who want to use it. An assessment of these authors' contributions generally reveals that sharing of knowledge is significant to organizational procedures.

2.4.4 Knowledge Application

Knowledge application can be defined as a method of using knowledge to new circumstances where workers can acquire and create new knowledge; this can be coupled with the existence of operational storage and recovery mechanism that allows the accessibility of that knowledge without difficulty (Lin and Lee 2005; Senge 2006). An assessment of the above assertions reveals that organizations need to implement knowledge management principles and processes in order to effectively profit from initiatives of knowledge management. Generally, the successful execution of knowledge management initiatives largely depends on the above mentioned knowledge management concepts. Generally, knowledge management can be used as a strategic move for organizational efficiency, effectiveness, and sustainable competitive advantage.

2.4.5 Knowledge Management concepts and antiretroviral therapy (ART)

A number of studies have been done in Sub-Saharan Africa to assess the retention levels of patients on ART. A study conducted by Rosen et al. (2007) revealed that on average 80% of the patients are retained on ART during the first 6 months of initiation on ART. The figure dropped to between 25% and 75% by the end of second year. This study showed that it is difficult to retain patients on ART as the figure is likely to drop further as the number of years after initiation increases. According to the Rosen et al. (2007) study the major cause of attrition of patients on ART is lost to follow up. However, the study did not investigate the reasons for lost to follow up and what could be done to track patients so that they remain in care. The study did not look at whether a good management process could be effective in maintaining patients in care, something that was investigated in research. A study conducted in South Africa over a five year period (2005 - 2009) showed a retention rate of 82.4% of patients who were initiated on ART (Boyles, et al., 2011). One of the major factors contributing to the high retention rate in that study was the issue of task shifting where care was decentralized to local clinics and patients on ART do not have to travel long distances to obtain their drugs (Boyles, et al., 2011). However, the study did not investigate how knowledge management concepts could have impacted on the high retention rate. Hence, study come handy in assessing the effect of knowledge management process on retention of patients on ART.

A similar study conducted in Malawi in 2012 revealed different rates of retention of HIV positive women including pregnant women on ART across the different reasons for getting ARVs (Tenthani et al., 2014). The study showed that patients who were initiated on ART when they were pregnant were five times more likely to defaulter on treatment after the initial visit than the women who were started on ART because of their own health (Tenthani et al., 2014). Overall, the study revealed that 17% of all women who were initiated on ART were lost to follow up six months after being initiated on ART, with higher level health facilities which had electronic medical records having a higher loss to follow up (24%). Tenthani, L. et al., (2014) further postulated the reasons for the difference in lost to follow up rates among the different women; the main reason cited was the lack of adequate preparation of women to start on ART and thus they would less likely follow treatment instructions and to attend follow up visits; this supported the findings of Orrell, C. (2005) and Gebrekristos et al. (2005)

2.5 Knowledge Management Factors

2.5.1 Information and Communication Technology (ICT) and Knowledge Management

There have been several studies that looked at the effects of ICT on knowledge management. A study carried out by Allahawiah, Al-Mobaideen and Nawaiseh in Jordan (2013) showed that ICT has an impact on knowledge management. Another study carried out by Saadi, (2010) in Jordan revealed a trace of the use of ICT in planning and implementation of the project interventions. There is limited study that looked at the relationship of ICT and knowledge management in Zimbabwe. In this study, the researcher did not just look at the impact of ICT on KM but on the impact of ICT on quality of healthcare focusing on the retention of pregnant women in ANC.

ICT applications can be used to support the exchange of knowledge between and within organizations (Bolisani and Scarso, 1999). In addition, Wang and Ariguzo (2004) alluded that the effectiveness of the user – computer interaction is critical for knowledge management not just the abundance of information. Mercader et al (2006) agree with above scholars and postulated that information technology is an important tool that can play a part in knowledge management creation. Furthermore, Johannessen et al (2001) indicated that ICT has an active role in deciding the success of the implementation of knowledge management systems. Robey et al (2000) supported the above assertions as well and they stated that information technology is often designed to support the knowledge management through ensuring that there is availability of information which would be valuable as long as the assumptions on which they are based do not become absolute.

Demirkan (2013) noted that there is need for a paradigm shift in how healthcare organisations use information technology. He further postulated that sustainable healthcare services can be enhanced through use of electronic health records and emergent mobile. In a study conducted by Peirson, Ciliska, Dobbins and Mowat (2012) regarding knowledge management tools for use in public health, the informants highlighted the importance of building awareness and providing training to health workers so that they would be able to navigate

and use the system. This implies that for ICT to be effective in promoting knowledge acquisition and sharing there is a need to build the capacity of the users of ICT. However, whether there is a direct link between ICT and Knowledge Management especially in the health sector is yet to be proved.

Avital and Carlo (2004) declared that knowledge management depends on technology. Furthermore, the writers affirmed that information technologies and expertise play a crucial part in an organization's strategy for knowledge management. In addition, the authors acknowledged that a knowledge management system is an information system that is computer-based, which is intended to assist effective formulation and sharing of knowledge.

Gupta and Govindarajan (2000) declared that it is vital to underline the distinction between information management and knowledge management. Though many companies believe that knowledge management is synonymous with information management, this is not the case as postulated by the authors who indicated that all knowledge begins as information (MSU, 2013). The authors highlighted that having such a perception leads to the misguided notion that creating an information technology structure would definitely result in enhanced knowledge management. Artail (2006) supported Gupta and Govindarajan (2000) when he asserted that an excellent information technology infrastructure is different from KM itself. Technology can be useful in providing a platform for facilitating many KM processes and innovations. Hasanali (2002) supported the above authors, when he cautioned that though technology is fundamentally significant to enable the workforce to cooperate, the role of technology infrastructure ought to be viewed as an instrument in supporting the KM initiatives and should not be considered to be the base of the initiative itself. An assessment of the reviewed literature from the different authors and scholars mentioned above reveal that they concur that IT is a tool to enable KM and it is not KM itself. As such, IT has to be considered as one of the factors crucial for the success of KM implementation (MSU, 2013).

The study by Dixon (2002) proclaims that, technology can be used as a mechanism in a collection process that manage the formation, utilization and dissemination of knowledge to accomplish organizational objectives as part of the knowledge management strategy. Furthermore, asserts that technology is a platform for transferring explicit knowledge so that that knowledge can be internalized and incorporated into the experience of the individual. He recognized that the technological tools should be used as enablers and this could enhance knowledge integration, thus supporting the claims highlighted earlier on by Avital and Carlo (2004). Bloodgood and Salisbury (2001) argued that knowledge may be made explicit and thus codified into an expert or decision support system. Generally, this opinion is in agreement with the previous affirmations made by Hansen et al (1999).

2.5.2 Information and Communication Technology (ICT) and Quality of Healthcare

Agha (2010) highlighted that there has been a link between information technology and the growth of the organisation in a number of sectors. The Health Information Technology (HIT) is one of the innovations that could be used to transform productivity in healthcare (Agha, 2010). However, Agha (2010) study showed that the adoption of HIT had very little effect on the quality of healthcare, as measured by patient mortality rates, and medical complication rates. The findings from the Agha (2010) study seemed to suggest the lack of association between HIT and improvements in the quality of hospital care offered to patients. However, other studies proved otherwise. A study by Adams, Mann and Bauchner (2003) discovered that HIT improved the overall quality of care delivered to patients. This was supported by Chaudhry et al (2006) whose study looked at the effect of HIT on quality, efficiency and cost of medical care; the study revealed that HIT resulted in increased adherence to treatment guidelines, improved surveillance and monitoring and reduced medical errors. Another study that looked specifically at health-care delivery, reported that about one half of all serious medical errors resulted from lack of adequate information (Bates and Gawande, 2003). However, all these studies did not look at a number of healthcare variables such as antenatal care, access to immunisation, newborn mortality which were looked at by the study. Nevertheless, Glickman et al., 2007 postulated that information technology has an important role in improving availability of information at the point to care and across institutions. The current study not only investigated the impact of information technology on availability of information but the effect of information technology on retention of pregnant women in ANC.

2.5.2.1 Information Technology and the retention of pregnant women in ANC

Several studies have been done on the influence of information technology on the retention of pregnant women in ANC. Amoah et al. (2016) in their study in Ghana showed that the use of mobile phones increased access of pregnant women to ANC services. Amoah et al. (2016) further postulated that mobile phone application can be used to provide professional monitoring and supervision of pregnancy related conditions especially in rural areas where ANC was previously difficult. This would in turn lead to increased retention of pregnant women in ANC. Demirkan (2013) stated that sustainable healthcare services can be enhanced through use of electronic medical records. However, there is no mention of the link between the conventional information technology at health facilities can be used in conjunction with mobile technology to increase uptake of ANC services by pregnant women. The study looked at whether information technology in its entirety can be effected in retaining pregnant

women in ANC. According to WHO the pregnant women are supposed to book for ANC and attend at least 4 ANC visits (WHO, 2015). The ANC retention is measured by the percentage of pregnant women who would have booked for ANC and who would attend at least 4 ANC visits.

2.5.3 Human Capital and Knowledge Management

Human capital refers to what and how an individual worker in an organization can bring and contribute towards the success of the organization (Daud, Zainol, and Mansor, 2014). It can be referred as the joint value of knowledge, skills, capabilities, and how the work force is motivated. Nonaka and Takeuchi (1995) postulated that knowledge and human capital are critical to an organization's main source of productivity and value addition. Human capital is acknowledged as the strategic value of human assets, and a combined value of the employees (Daud, Zainol, and Mansor, 2014).

The knowledge management capability in an organization and the capability of an organization to create new knowledge through its workforce is one elusive resource that has been acknowledged by investigators and scholars (Daud, Zainol, and Mansor, 2014). Strategic human resource management configurations have been found by researchers to be considerably related to organizational knowledge management competency through the effect on work force characteristics such as human capital, and employee motivation (Daud, Zainol, & Mansor, 2014). Human capital advantages can be generated by organizations through recruiting and retaining outstanding people; this can be achieved by maintaining a pool of unique human talent (Boxall and Mack, 2009). Knowledge management is reliant on the knowledge and inspiration of employees within the organization as postulated by Daud, Zainol, and Mansor (2014). Consequently, the main factors that triggered organization's knowledge management competences are the organizational policies, strategies and guidelines that have an impact on the human resource of the organization. As such, human capital has a high potential to be a key driver in knowledge creation.

There are different perspectives on knowledge management taken by researchers and academics. These perspectives range from technological solutions to the use of best practices (Zaman, Mahtab and Rizvi, 2014). Employee training and motivation are the key factors to knowledge management (Zaman, Mahtab and Rizvi, 2014). Though there are widespread arguments among scholars about the definition of KM, it has been applied to a very wide range of activities designed to manage, exchange and create or promote intellectual assets within an organization (Zaman, Mahtab and Rizvi, 2014). The impact of Human Capital on Knowledge is another point of discussion.

2.5.3.1 Human Capital and access to immunization by children

A study conducted by Maekawa et al. (2007) in Western Pacific region revealed a significantly higher number of children accessing immunization at outreach points compared to static sites (60% of the children were immunized at outreach points). Health facilities would be able to conduct outreach immunization sessions if there are enough health workers to do that, hence the impact of human capital on immunization is important to assess.

3. RESEARCH METHODOLOGY

The researchers used an explanatory research design. The main aim of explanatory research is to identify any causal links between the factors or variables that pertain to the research problem. This was clearly the focus of this research study, hence the design was considered relevant. The explanatory research design was chosen for this study because it helped the researchers to gain insight into whether there are any relationships between knowledge management and the quality of healthcare as measured by retention of pregnant women in ANC, retention of patients on ART, reduction in new born mortality and access to immunisation by children in Manicaland, Zimbabwe. The research study utilised quantitative. The population for this study comprised qualified nurses from all the health facilities including clinics and hospitals from the public sector in Manicaland Province. The total population was 939 respondents. Cluster random sampling technique was used to draw the 209 nurses from the total population.

4. RESULTS AND DISCUSSION

This section presents an analysis of the data collected and the results from the research. In addition, interpretation and presentation of the findings in line with the research objectives are articulated.

Table 4.1: Descriptive statistics

Variable dimension	Mean	Standard deviation	95% Confidence interval
Knowledge Management variables			
Knowledge acquisition	4.23	0.23	[4.196, 4.263]
Knowledge sharing	3.96	0.29	[3.923, 4.005]
Knowledge utilisation	3.83	0.37	[3.776, 3.882]
Information technology	3.36	0.74	[3.248, 3.463]
Organisation and Human Capital	3.87	0.36	[3.822, 3.925]
Dependent variables			
ANC retention	3.98	0.85	[3.86, 4.11]
New-born mortality	3.95	0.75	[3.84, 4.05]
ART retention	4.35	0.51	[4.27, 4.42]
Access to immunisation	3.91	0.85	[3.92, 4.13]

As shown in table 4.1, the mean scores obtained for the knowledge management variables was found to range from 3.36 with a standard deviation of (the measure of dispersion) of 0.74 being the lowest for information technology to 4.23 being the highest mean, scored by knowledge acquisition, with a standard deviation of 0.23. In relation to the remaining variables, knowledge sharing had a mean of 3.96 with a standard deviation of 0.29; knowledge utilisation had a mean of 3.83 with a standard deviation of 0.37 and organisation and human capital had a mean of 3.87 with a standard deviation of 0.36. The small range of standard deviations (0.23-0.74) for the different dimensions of knowledge management indicates that the responses received were not widely dispersed. Such a finding was important for the study, as it facilitated the use of appropriate parametric tests in further analysis.

The highest mean score for the dependent variables was obtained by ART retention (4.35), with a standard deviation of 0.51, followed by ANC retention, which scored a mean of 3.98 with a standard deviation of 0.85. The lowest mean in terms of dependent variables was recorded in access to immunisation with a mean score of 3.91 with a standard deviation of 0.85. The 95% confidence intervals for all the mean responses are “tighter” revealing that the population means are almost the same as the sample means for each response. The high mean values and low standard deviations mean that there is evidence of knowledge management implementation at health facilities. The low standard deviations (all less than 1) implied that there was less variability across the responses from the respondents.

4.1 Knowledge Management process available at health facilities

The research sought to establish any knowledge management processes available at health facilities. The knowledge management process was divided into three namely knowledge acquisition, knowledge sharing and knowledge utilisation. These are highlighted below.

4.1.1 Knowledge Acquisition

Table 4.2: Mean scores of knowledge acquisition process

Variable dimension	Mean Score	Std deviation	95% Confidence interval
Health workers obtain a good extent of new knowledge from external sources	4.4	0.522	[4.32, 4.47]
Health workers obtain a good extent of new knowledge from other partners	4.18	0.388	[4.13, 4.24]
Health workers have right to visit and access KM services	4.18	0.384	[4.12, 4.23]
Health workers rely on written sources to acquire knowledge	4.16	0.406	[4.10, 4.21]

Source: Survey/Primary Data

Table 4.2 depicts knowledge acquisition practices at health facilities. All the mean scores were above the expected average of 3. There are different ways of promoting knowledge acquisition at health facilities. The health workers obtain a good extent of new knowledge from different sources such as other partners which include the district, suppliers, clients/patients and from external sources such as seminars, conferences, and educational courses. The most common source of new knowledge is other partners; this scored an average of 4.4, followed by external sources which include seminars, and educational courses, which scored 4.18. Apart from that, there is evidence of health workers relying on written sources as bases for knowledge, scoring an average of 4.16. The written sources include treatment guidelines, protocols, strategies and policy documents which guide

the health workers in their day to day activities.

4.1.2 Knowledge sharing

According to Mannie, Van Niekerk and Adendorff (2013), firms and companies have realised the strategic significance of KM, and are progressively concentrating efforts on practices to foster the distribution and dissemination of knowledge. In order to have an impression of the degree of knowledge sharing and transfer at health facilities, questions were focused at discovering out if an environment for knowledge sharing and transfer existed within the health facilities.

Table 4.3: Mean scores of knowledge sharing process

Variable dimension	Mean Score	Std deviation	95% Confidence interval
Health workers exchange knowledge with their co-workers.	4.18	0.491	[4.10, 4.24]
Health workers share knowledge orally at meetings or informal gatherings	3.98	0.508	[3.91, 4.06]
Health worker tasks require cross-departmental information sharing	3.97	0.422	[3.91, 4.03]
Health workers share knowledge through formal procedures	3.91	0.560	[3.83, 3.99]
There are proper organizational guidelines on information sharing	3.91	0.611	[3.82, 4.00]
Health workers see urgent need to share information	3.84	0.708	[3.74, 3.94]

Source: Survey/Primary Data

There is high level of knowledge sharing among health workers as shown by an average score of 4.17, followed by sharing of knowledge orally during meetings or informal gathering, with a mean score of 3.98. The least item under knowledge sharing was the need by the health workers to see the need to share information. This scored an average of 3.84. This is higher than what was obtained in a study that was conducted in South Africa by Badimo and Buckley in 2014 focusing on enhancing knowledge management practices in South African healthcare system; the urgent need to share information scored lowest (15% of the health workers cited the urgent need to share information as important).

Generally, from the study, knowledge is shared among health workers mostly orally among co-workers and at meetings or informal gatherings, for example during lunch time. Formal procedures of knowledge sharing such as project reports, organisational procedures and publications were among the least scored.

4.1.3 Knowledge utilisation

The sustainability and accomplishment of any firm or company is basically a function of how its resources can be leveraged (Badimo and Buckley, 2014). The respondents were asked on how knowledge is utilised within their respective health facilities and table 4.4 shows the mean scores.

Table 4.4: Mean scores of knowledge utilisation process

Variable dimension	Mean Score	Std deviation	95% Confidence interval
KM services help to reduce mortality of new born babies	4.37	0.485	[4.30, 4.44]
Health workers, rely on experience, skills and knowledge.	4.13	0.385	[4.08, 4.19]
Health workers know about each other knowledge needs	3.72	0.697	[3.62, 3.82]
If health workers have any problems regarding work, they solve them using KM services	3.59	0.967	[3.45, 3.73]
Health workers consider their knowledge as an organizational asset and not their own source of strength	3.34	0.914	[3.21, 3.47]

Source: Survey/Primary Data

The KM services were predominantly used to reduce mortality of new born babies as cited by the respondents. This had the highest mean score of 4.37, followed by the reliance by the health workers on experience, skills and knowledge, which scored an average of 4.13. The use of KM services to solve work related problems was among the least scores (3.59). Despite being among the least scored, it is higher than what was found in a similar study that was conducted in South Africa in 2014 by Badimo and Buckley; only 2% of the respondents cited that they would use KM services to solve work related problems. Generally, from the study, knowledge utilisation is relatively high among the health facilities as it scored above average in all the

components.

4.2 Information Technology

Maier (2002) highlighted the importance of the technological tools for keeping and distributing suitable knowledge. He further postulated that the key aim of these components is to offer the users with evidence at the right time (Maier, 2002). The study looked at information technology and how it was used in health facilities to promote knowledge management and whether it would have any effect on healthcare. Table 4.5 shows the mean scores for the IT components asked to the respondents during the study.

Table 4.5: Mean scores of information technology

Variable dimension	Mean Score	Std deviation	95% Confidence interval
IT tools are used to store data on implemented interventions, tasks and activities	3.5	0.933	[3.36, 3.63]
Health worker see the advantage of using IT tools in the fact that it prevents the loss of knowledge.	3.56	0.803	[3.44, 3.68]
Use of IT tools helps to retain pregnant women in antenatal care.	3.47	0.920	[3.34, 3.61]
IT tools are used to store information on suppliers and clients/patients.	3.38	0.977	[3.24, 3.52]
IT tools enable effective work.	3.36	0.835	[3.23, 3.48]
IT tools are used to support collaborative work (e.g. calendars, video conferencing systems, communication tools).	3.29	0.891	[3.16, 3.42]
IT tools are simple to use and have a user friendly interface.	2.9	0.879	[2.77, 3.03]

Source: Survey/Primary Data

All the mean scores except the one on “IT tools being simple to use and have a user friendly interface” were significantly different from 3, as noted that the p-values. The component that had the highest mean score was the fact that health workers see the advantage of using IT tools as they prevent loss of knowledge which scored a mean of 3.56 followed by the use of IT tools to store data on implemented interventions, tasks and activities which scored a mean of 3.49. Despite the fact that IT tools are important and can be used to promote knowledge management, they are not simple to use and do not have a user friendly interface, the least scored component. Whether IT tools are simple and have a user friendly interface scored the least (2.9), which is even below the expected average of 3. The low standard deviations (all less than 1) implied that the responses from the respondents were not very different from each other; there was variability across the respondents. The 95% confidence intervals are used to estimate the population means for each of the variables. For instance, the population mean for the IT tools being able to enable effective work lies between 3.23 and 3.48 at 95% confidence interval. Generally, the findings from the study on IT are in harmony with what Kruger and Johnson (2010) postulated when they stated that IT and Information management are enablers of knowledge management.

4.3 Organization and Human Capital

Human capital coupled with good organisational structures can be vital to improve knowledge management. The respondents were asked to score on given organisation and human capital components and the mean scores by component are shown in table 4.6.

Table 4.6: Mean scores of organisation and human capital

Variable dimension	Mean Score	Std deviation	95% Confidence interval
There is a general inclination to cooperation and exchange of experience among health workers	3.87	0.514	[3.80, 3.95]
The general management/leadership promotes cooperation and exchange of experience among health workers	3.95	0.601	[3.86, 4.03]
Health workers generally trust each other and easily rely on knowledge and skills of their co-workers	3.9	0.513	[3.82, 3.97]
Good work is rewarded accordingly	3.68	0.774	[3.56, 3.79]
Innovative practices are rewarded accordingly	3.73	0.809	[3.61, 3.85]
Health workers are prepared to take additional efforts and work	3.94	0.594	[3.86, 4.03]
Management/leadership motivates employees to engage in formal education systems to achieve a higher level of education	3.83	0.806	[3.71, 3.94]
Management/leadership motivates employees to engage in informal education systems	3.82	0.688	[3.72, 3.92]
Management/leadership supports on the job trainings of employees	3.91	0.525	[3.83, 3.98]
Management support to employees helps to improve access to immunization by children aged less than 1 year	3.97	0.444	[3.91, 4.04]
Health workers support exchange of data, information and knowledge among departmental units	4.01	0.508	[3.93, 4.08]

Source: Survey/Primary Data

The support of knowledge sharing across departmental units had the highest mean score of 4.01, followed by management/leadership support promotes cooperation and exchange of experience among health workers (3.95). Of note is that there is a great support by Management to employees to engage in engage in formal education systems to achieve a higher level of education and in informal education, scoring 3.83 and 3.82 respectively. The least mean score was on the reward of good work, which scored a mean of 3.68. The standard deviations were low (all less than 1) implying that the responses were not very different across the respondents. The highest standard deviation is 0.809. The confidence intervals imply that the true population means for each of those variables lie in that interval. For instance, the population mean for good work being rewarded accordingly lie between 3.56 and 3.79 at 95% confidence interval.

4.4 Hypothesis Testing

Simple linear regression analysis was conducted to test each hypothesis.

4.4.1 Hypothesis 1

H_0 : There is no association between knowledge management and the reduction of mortality of new-born babies in health facilities

The results from the regression analysis are shown in table 4.7.

Table 4.7: ANOVA Table (Hypothesis 1)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1.994	1	1.994	3.573	.060 ^b
Residual	105.482	189	.558		
Total	107.476	190			

The p-value from the ANOVA table is 0.06 which is greater than 0.05 as such the null hypothesis is accepted. This implies that there is no association between knowledge management and the reduction of mortality of new-born babies in health facilities. Comparing the hypothesis test results with the secondary data as shown in table 4.8 shows that over the past four years there has been an increase in the number of mortality of new-born babies in the same facilities where the study was carried out despite the implementation of knowledge management. The number of deaths of new-born babies increased by 9% in 2015 from 2012.

Table 4.8: Number of early neonatal deaths, Manicaland Province

Year	Number of deaths
2012	569
2013	515
2014	609
2015	621

Source: Secondary data

4.4.2 Hypothesis 2

H₀: There is no association between information technology and the retention of pregnant women on antenatal care (ANC) in health facilities

The independent variables associated with this hypothesis include use of IT tools to store data/information, use of IT tools to support collaborative work, presence of simple and user friendly IT tools. The dependent variable is the retention of pregnant women on ANC. The regression results are shown in table 4.9.

Table 4.9: ANOVA table (hypothesis 2)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.012	1	.012	.017	.896
Residual	129.900	180	.722		
Total	129.912	181			

The p-value from the ANOVA table is 0.896 which is greater than 0.05 as such the null hypothesis is accepted. This implies that there is no association between information technology and the retention of pregnant women on antenatal care (ANC) in health facilities. The application of information technology in health facilities does not affect the retention of pregnant women on ANC. This is in line with Agha (2010) study that showed that health information technology adoption has little effect on the quality of care, measured by patient mortality, and medical complication rates. However, the findings differ from other studies which supported that information technology has an impact on overall health care delivered to patients (Adams, et al, 2003; Chaudhry et al, 2006). This could be supported by the low score on whether the IT tools are simple and user friendly, hindering effective utilisation of the information technology. Lapointe and Rivard (2006) in their study noted that there was resistance to use of technology by nurses and doctors. The IT might also be a domain of the IT staff and other professionals may not be directly involved (Lapointe and Rivard, 2006).

4.4.3 Hypothesis 3

H₀: There is no relationship between knowledge management process and the retention of patients on antiretroviral therapy (ART) in health facilities

The regression analysis results are shown in table 4.10

Table 4.10: ANOVA Table (hypothesis 3)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.013	1	2.013	8.051	.005 ^b
Residual	46.513	186	.250		
Total	48.527	187			

The p-value from the regression analysis is less than 0.05 (0.005). As such, the null hypothesis (H₀) is rejected and it can be concluded that there is a relationship between knowledge management process and the retention of patients on antiretroviral therapy (ART) in health facilities.

4.4.4 Hypothesis 4

H₀: There is no association between human capital and access to immunisation by children aged less than 1 year in health facilities

The regression analysis results are shown in table 4.11.

Table 4.11: ANOVA Table (hypothesis 4)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	2.597	1	2.597	4.845	.029 ^b
Residual	101.319	189	.536		
Total	103.916	190			

The p-value from the regression analysis is less than 0.05 (0.029). As such, the null hypothesis (H₀) is rejected and it can be concluded that there is association between human capital and access to immunisation by children aged less than 1 year in health facilities. The findings support the work of Hatcher and Dyer (2004) who purported that certain human resource elements such as selection and development can ensure that there is improvement on a firm's overall performance.

5. CONCLUSIONS AND RECOMMENDATIONS

The study concluded that the implementation of knowledge management does not reduce the mortality of new-born babies. It can be concluded that full utilisation of information technology is crucial for effective management and retention of pregnant women on ANC. Full utilisation of IT tools would also impact on knowledge management concepts such as knowledge acquisition, knowledge sharing and knowledge utilisation.

The study further concluded that the knowledge management process has an impact in increasing

retention of patients on ART. However, the knowledge utilisation component of the knowledge management process was the least scored and MOHCC should strengthen that component. Retention of patients on ART involves ensuring that patients are not lost to follow up and should remain in HIV care. Effective utilisation of knowledge is crucial in ensuring that the patients continue to remain in HIV care. Effective mechanisms of utilising knowledge such as installing a patient level electronic system could be put in place at all health facilities managing patients on ART. This would ensure that patients are easily monitored and their treatment outcomes clearly documented.

Additionally, the study can conclude that human capital has an effect on access to immunisation by children. As such, good management of available human capital is essential.

The study recommends that since knowledge management seemed not to have an impact in reducing new-born mortality, the MOHCC should still embrace knowledge management coupled with other interventions. Knowledge management is a way of embracing knowledge and achieve organisational objectives (Cho et al, 2009). As such, if the MOHCC sets realistic and achievable objectives and targets, and ensure full implementation of knowledge management, the new-born mortality could be effectively arrested.

The Ministry of Health and Child Care should fully make use of information technology in order to improve on health care component of retaining pregnant women on ANC. As stated by Kruger and Johnson (2010) information technology and information management are enablers to knowledge management. As such, by completely embracing information technology the MOHCC could be able to effectively implement knowledge management which would consequently increase viability of health facilities. In return pregnant women booking for ANC services could be effectively monitored and ensured that they remain in care. Apart from that, the MOHCC should strengthen IT implementation through the use of mobile phone application where each booked pregnant woman can receive sms messages reminding her of her due dates, dates of appointments. This could be supported by Amoah et al. (2016) in their study in Ghana where the use of mobile phones increased access of pregnant women to ANC services. Amoah et al. (2016) further postulated that mobile phone application can be used to provide professional monitoring and supervision of pregnancy related conditions in rural areas where ANC was previously difficult. This would in turn lead to increased retention of pregnant women in ANC.

The MOHCC should also introduce patient medical records in order to strengthen recording and real time monitoring of patients. This recommendation can be drawn from the assertion by Demirkan (2013) which stated that sustainable healthcare services can be enhanced through use of electronic medical records.

As cited by Harries et al (2010) the MOHCC should strengthen information management strategies and these could lead to reduction in deaths of patients on ART. Apart from that the MoHCC should put in place a standardised system to quickly detect loss to follow up of patients on ART. By strengthening knowledge utilisation, the MOHCC can be able to detect bottlenecks or facilities with high defaulter rates and targeted interventions implemented.

The human resource management policies which motivate, encourage, and facilitate sharing of knowledge among individual health workers should be highly promoted by MOHCC, as Human Capital was found to have a positive effect on improving access to immunisation by children aged less than 1 year. In addition, the MoHCC should strive to improve reward of good work so that the health workers are fully motivated and encouraged to share and utilise knowledge within the health facilities. This could be supported by DeLong (2004) who cited that knowledge sharing could be enhanced through including it in formal rewards and recognition systems such as performance appraisals. Apart from that the MoHCC could establish mentoring programmes in order to develop the capacity of the health workers in providing immunisation to children. As postulated by Martinez (2007) quoting DeLong (2004) mentoring is important in transferring technical, operational and managerial skills to new employees. This can also be supported by Lee and Hong (2014) who postulated that hospital organisations should create and develop knowledge through motivating the employees to share the knowledge and continually foster innovation. As such, rewarding innovation could be greatly effective.

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