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MAPPING THE USE OF HEALTH INFORMATION SYSTEMS: A SYSTEMATIC REVIEW OF EVIDENCE FROM CAMEROON.

Achataseh Godwill[1] (Faculty of Business Administration and Sustainable Development, ICT University, Yaoundé, Cameroon, godwil9241@gmail.com; Henry Koge[2] (Teach Connect, Yaoundé, Cameroon, hogehenry.m@gmail.com)

Abstract

While innovative technologies continue to push the frontiers of the health sector, there has been growing interest in implementing Health Information Systems (HIS) in many countries as part of a strategy to improve healthcare delivery and management (Chebet, 2022; R. M. Kamadjeu et al., 2005; Restuccia et al., 2012). Cameroon is not left out and has in recent years developed an interest in the implementation of HIS. This commitment an interest has been translated in to the countries 2020-2024 Digital Health Strategic Plan (MOH, 2020). This review is conducted to provide a deep understanding of the current level of implementation of HIS in Cameroon, building on existing evidence from studies on the HIS development and implementation. The findings from this review, provide a solid base for understanding HIS development and implementation in Cameroon. This gives useful insights to inform the actions of policy makers, healthcare providers and stakeholders in their efforts to toward the digitalization of the health care system in Cameroon.

Keywords: Health Information Systems; Digital Health; Technologies; E-health; Cameroon

Introduction

There has been great evolution in the understanding development and use of technology in the health care sector, and particularly Health Information Systems (HIS) in Cameroon over the past two decades. In 2000, the country had a limited health information system, with most health facilities relying on paper-based records (Emmanuel Ngwakongnwi et al., 2014). The current challenges in the health sector, informs the increasing need for efficient and effective healthcare delivery, to which digital technologies could provide useful solutions. According to Daniela Haluza et al., (2014), the digital revolution is relevant for healthcare providers. The advent of technology, digital platforms and services have enabled countless innovations that helped mitigate barriers in access to health, social and economic opportunities. The government of Cameroon like other developing countries has been exploring the opportunities provided by Health Information Technology together with other partners (MOH, 2020). This has informed efforts and investments in the development and implementation of Health Information Technologies in the Health Care Sector in Cameroon.

According to Emmanuel Ngwakongnwi et al. (2014), Cameroon's efforts in the implementation of Health Information Systems dates back to the early 90s when the National Health Information System (NHIS) was introduced. This was designed to provide a comprehensive and integrated health information system that would enable the government to monitor and evaluate the health

status of the population, as well as the performance of the health system.

In 2018, Member states of the World Health Assembly endorsed the Resolution on Digital Health. This resolution highlights the value of digital technologies, contributing to the advancement of universal health coverage (Najeeb, 2013). It encourages countries and stakeholders to direct their efforts towards creating a consistent eHealth vision in line with a country's health priorities and resources, developing an action plan to deliver the proposed vision, and creating a framework for monitoring and evaluating eHealth implementation and progress (World Health Organization, 2021).

Building on this resolution, Cameroons Ministry of Public Health as part of the commitment to promote the development of an E-Health Strategy launched its national digital health strategi plan which aimed to leverage technology to improve the quality and accessibility of healthcare services across the nation (MOH, 2020). The 4 years strategy covering period 2020-2024, focused on the development and implementation of electronic health records (EHRs) and other health information systems to support the delivery of healthcare services. This strategy aligns with the 2016-2027 Health Sector Strategy (HSS) and the Digital Cameroon 2020 vision to facilitate the achievement of their respective objectives for universal health coverage (MOH, 2016).

Since the launch of the eHealth Strategy, the implementation of HIS has been a priority for the government and international organizations. there have been several initiatives aimed at implementing EHRs and other HIS in Cameroon. Some of these systems, include the District Health Information System 2 (DHIS2), eHealth, Electronic Health Records, Electronic Medical Records and mHealth systems.

Despite these initiatives, the implementation of HIS in Cameroon has faced several challenges such as limited funding for HIS projects, inadequate infrastructure, limited expertise, and low levels of adoption. There is still a significant reliance on paper-based records in many health facilities. According, Odette (2020), slow adoption of e-health remains a challenge for Cameroon. In addition, Nguefack-Tsague et al., (2020), suggest that the poor performance of Routine Health Information Systems in Cameroon is associated with limited training of staff, regular supervision and feedback. These studies suggest the need to bridge the gap between the digital economy and health care services.

Overview of the Cameroon Health System

Cameroon is a low-income country in Central Africa with a population of over 25 million people. The country has a fragmented healthcare system, with both public and private providers and is under-resourced, with a shortage of healthcare workers, inadequate infrastructure, and limited funding (MOH, 2016a). These challenges have contributed to poor health outcomes, including high rates of maternal and child mortality, and a high burden of communicable diseases such as HIV/AIDS, malaria, and tuberculosis.

According to Ngwakongnwi et al., (2014), these challenges have contributed to poor health outcomes and equally affected the level of implementation of HIS. While there exist several applications in the HIS market in Cameroon such as CardioPad, GiftedMum, DAMA and EMR, these systems are tailored for the management of specific health conditions and remote health interventions. No provision has yet been made for the establishment of an eHealth pyramid or a

Cameroonian eHealth ecosystem integrating and organizing current initiatives (MOH, 2020).
Existing systems are under exploited with very low engagement on the part of the different stakeholders in health ranging from policy actors to service delivery actors. Compared to the level of implementation in developed countries, the level of consciousness on the need and adaptation to such systems is very low in developing countries (Christie et al., 2022).
This study is therefore important, as it examines the existing application of HIS in Cameroon. The output of the review seeks to accompany Government efforts in the development and implementation of Health Information Systems as part of the national strategy to improve on the health care system.

Method

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol was used for this systematic review (Matthew J et al., 2021). The following steps was taken:

1. Identification of relevant studies

An indebt search was conducted on electronic databases such as Google Scholar, PubMed, Web of Science Direct, as well as exploring grey literature sources such as conference proceedings and government reports. The search was conducted using a combination of keywords such as "Electronic Health Records", "Health Information Systems", "eHealth", "mHealth", "Electronic Medical Records", "Cameroon", "Implementation", and "Adoption".

2. Screening of studies

The titles and abstracts of the identified studies were screened for relevance, and full-text articles were obtained for further assessment in line with the requirements of the study.

3. Eligibility criteria

The following eligibility and exclusion criteria were specified for the study. Firstly, only journal articles with empirical data were chosen, secondly, the geographical scope was limited to studies conducted on Cameroon, thirdly, studies were to be focused on the implementation of Health Information Systems, fourthly, studies that are published in English and lastly 23 years period was chosen between 2000 and 2023 providing sufficient period to observe the related research and publication evolution.

4. Data extraction

Data was extracted from the included studies using a standardized data extraction form customized for the study. The following data elements were considered, study design, study scope, level of implementation, type of HITs system used, challenges and opportunities, impact and implications.

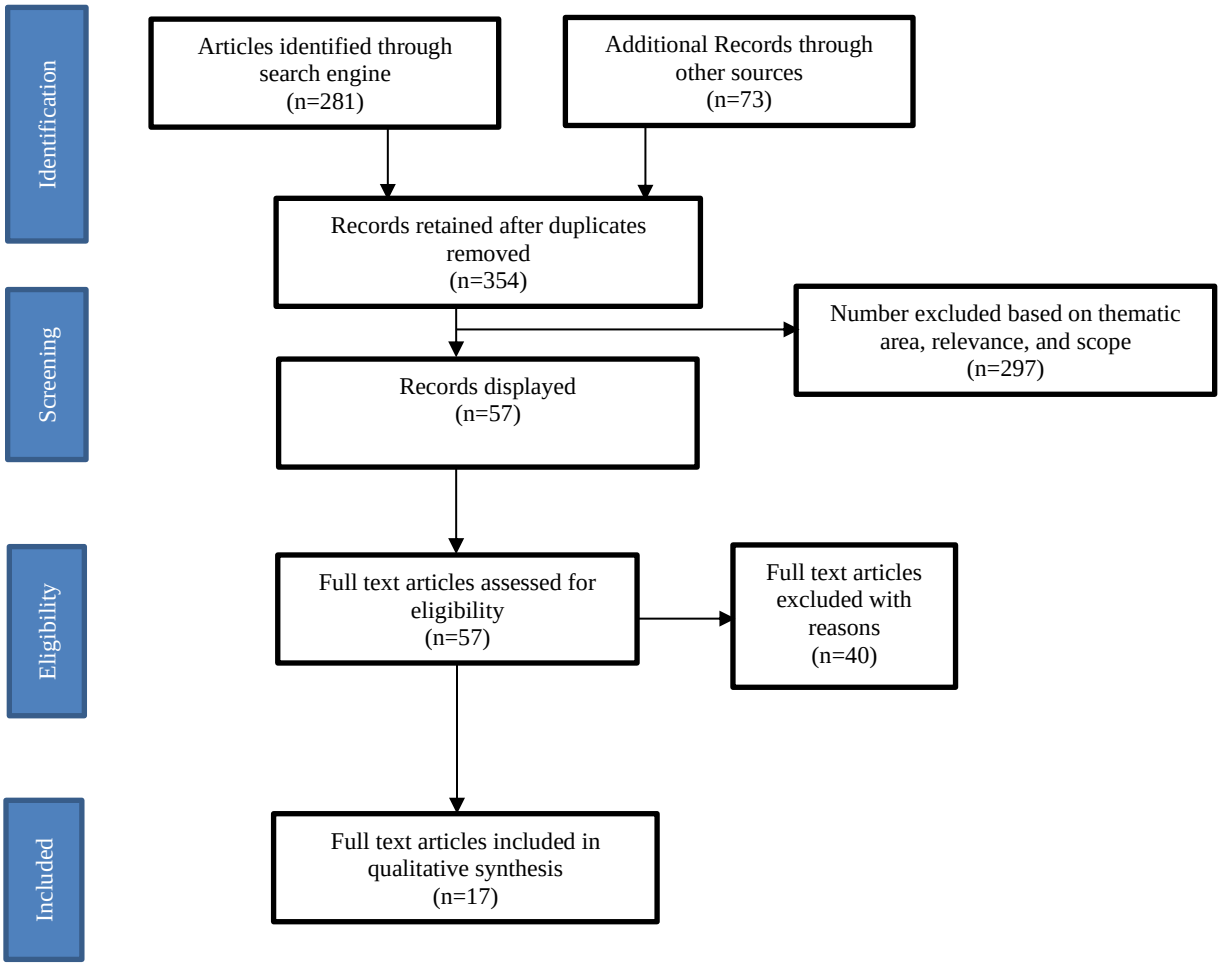
5. Data synthesis

The data extracted from the included studies was synthesized using a narrative synthesis approach. The findings have been presented in tables and graphs, and a thematic analysis conducted to identify common themes and patterns across the studies.

Results/Discussion/Implication

The implementation of Health Information Systems (HIS) has been identified as a key strategy for improving healthcare delivery and outcomes in Cameroon. While there were multiple

documentations on this topic from 2000-2023, there is limited information when screened in line with the requirements of study. This article focuses on articles that look at the use of EHR in Cameroon and assess the level of effectiveness, benefits, and challenges associated with their implementation.



PRISMA Analysis

As am emerging concept, there is a growing body of literature on HIS. Therefore, a rigorous screening process was employed following PRISMA guideline with the objective of selecting and retaining studies relevant to study. This process took into consideration all the recommended stages in PRISMA reviews including Identification, screening, assessment for eligibility and inclusion. The process saw the identification of 354 related studies from different data bases and grey literature. The first phase of the screening process saw the removal of duplicates using Zotero a reference management software. This step was followed by screening for relevance in line with the study objectives taking into consideration the study theme, relevance, and scope. The result was a rejection of 254 studies and retention of 57for display on a database customized for the study. A full text assessment was conducted on the 57 articles retained and 40 rejected and 17 retained for the study. Reasons for exclusion included studies not specific on the Cameroonian

context and with insufficient evidence to respond to the research objectives. The retained articles met the required criteria for inclusion including high quality and relevance to the study.

Status of implementation of HIS in Cameroon

Our review of the 17 studies retained for this review, 11 studies reported on cases of HIS implementation in Cameroon with focus on different types of Health Information Systems implemented. According to our analysis, the most implemented and used HIS were mHealth applications, Electronic Health Records (EHR) and clinical information systems. Other HIS included Health Management Information Systems (HMIS), District Health Information Systems, and Routine Health Information Systems (HIS).

Type of HIS Implemented	**Number of articles reported implemented**
mHealth systems and applications	4
Electronic Health Records	2
Clinical Information Systems	2
District Health Information System	1
National Health Information System	1
Routine Health Information System	1

Effectiveness of implementation

The implementation of HIS in Cameroon has been on the rise, with both state and non-state health actors adopting and implementing different HIS in their operations. An analysis of the studies revealed that the level of effectiveness of HIS implementation is determined by the type of HIS and the context of implementation. mHealth systems were reported to have a highest effectiveness rate. According to Nkemngu Blake Afutendem et al., (2019), the increasing number of people using cell phones provides an opportunity for the implementation of mHealth system tailored to the specific needs of users. While strengthening EHR implementation was found to improve patient care, reduce medical errors, and increase efficiency in healthcare delivery, there is a huge challenge of adoption which has significantly affected implementation (R. Kamadjeu et al., 2005).

While efforts are being made in the development and implementation of HIS in Cameroon, several challenges have retarded the implementation which includes inadequate infrastructure, lack of technical expertise, digital health leadership and resistance to change by healthcare providers (Bediang, 2023).

Implications for HIS development and implementation in Cameroon

1. Stakeholder engagement

To improve HIS implementation in Cameroon, there need for consolidated efforts and synergy in addressing the challenges limiting the implementation of HIS and design and common framework

to guide development and implementation. According to Emmanuel Ngwakongnwi et al., (2014) investing in electronic health information system without involving all stakeholders and adequately handling issues with current system is immature and will only retard progress.

2. Infrastructural Development and Training

Additionally, efforts should be focus on infrastructure development and training of healthcare providers. Training system users is vital in ensuring system adoption and acceptability (Nguefack-Tsague et al., 2020). Undertaking a situational analysis is relevant to inform the design and implementation of HIS. According to (Bawack & Kala Kamdjoug, 2018), a context specific study to determine level of system acceptance and predicting HIS adoption by clinicians in developing countries.

3. Data Privacy and Security

Information security, data privacy and security are becoming a global issue of importance within healthcare sector (Kabelo Given Chuma et al., 2021). In the era of technology, the adoption of digital patient records, increased regulation, provider consolidation, and the increasing need for information between patients, providers, and payers, all point towards the need for better information security (Appari & Johnson, 2010). The successful implementation of Health Information Systems requires the integration of data protection and security protocols in the systems design and implementation. The importance of data security and privacy in healthcare IT is crucial (Appari & Johnson, 2010). According to (Pouyan Esmaeilzadeh & Esmaeilzadeh, 2019), the perceived health information sensitivity and computer anxiety meaningfully contribute to information privacy concerns. Therefore, to ensure full efficiency, data security and privacy should be of paramount importance in the design and implementation of HIS.

4. HIS development and Test centers

Digital centers are very important in the design and implementation of digital health project and are decisive in the local training of stakeholders, the culture of good governance of digital health projects, the development of operational strategies. According to (Bagayoko et al., 2017) the absence of a centers of expertise in digital health greatly affects the implementation and success of digital health projects. According to this author, this results to fragmented manner of implementation, posing significant interoperability problems, and making it impossible to develop coherent digital health projects. This accounts for the failure of many of the HIS projects across the world.

Conclusion

To conclude, this review reviews despite the importance and the potentials of HIS to improve health care delivery, there very little evidence of successful implementation in Cameroon. The adoption and implementation of HIS is challenged by limited infrastructure, insufficient training, the absence of structures to accompany HIS projects and inadequate funding. Considering that HIS is an emerging field, this review inspires the need for further research to understand the impact of HIS implementation on Health Systems in Cameroon, comparative studies to determine best practices and examination of the factors that affect adoption and implementation in Cameroon.

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