International Journal of Computers and Informatics (IJCI)
Vol. (4), No. (12)

IJCI

المجلة الدولية للحاسبات والمعلوماتية
الإصدار (4)، العدد (12)

December 2025

Assessing the Needs and Limitations of Health Information Systems in Sudan

Mohamed Omer Mohamed
PhD Candidate, Department of Information Technology, College of Graduate Studies, National Ribat University, Sudan
mohruk199@gmail.com

Mudawi Mukhtar Elmusharaf
Professor, Faculty of Computer Studies, National Ribat University, Sudan

Abubaker Abdellbagi Adam
M.Sc. Graduate, Dept. of Software Engineering, Faculty of Computer Science and Information Technology, University of Malaya, Malaysia

Ahmed Abdelrahman Mohamed
M.Sc. Graduate, Dept. of Information Technology, Faculty of Graduate Studies, Al Neelain University, Sudan

Abstract

The health information system is an essential part of the health system. Having a comprehensive and flexible health information system is extremely important. It improves the quality of health care and helps in managing the health system with high efficiency with planning and follow-up planning. To achieve this, it is necessary to understand the current health information system, identify the challenges it faces, and evaluate the needs.

A qualitative methodology was followed, where semi-structured interviews were conducted with a number of stakeholders and participants in the health services in its various fields. The data collected from the interviews were analyzed. The result of this analysis reveals a good understanding of the current status of the health information system, an understanding of the status of the health system before and after the war, and identifying the current problems and obstacles.

The study found gaps in the current health information system, including that there are many sources of information outside the health information system, and even the information collected is usually estimated and inaccurate. There is no unified mechanism for exchanging information between different health institutions. There is only one approved system for collecting health information, which is DHIS2.

The study concludes with the necessity of introducing information sources that operate outside the umbrella of health information systems, with the integration of health information sources, with the need to create a framework through which health information is unified and exchanged.

Keywords: Health Information Systems, E-Health Systems, DHIS2.

1. Introduction

After the boom that the world is witnessing in all its fields (technical, service, etc.) and its rapid development, especially in the fields of computing and communications. This includes Sudan, so it was necessary to benefit from this prosperity in all fields, daily activities and services, and to develop the infrastructure and benefit from it in economic growth. It has become imperative for all government institutions, companies, and private organizations to take advantage of this boom to improve their services and daily requirements and raise their level of efficiency. From automating routine procedures in the government sector, through e-government, to smart government, all of which include distinct transformations in the banking, education and media sectors ending in the health field.

The existence of a comprehensive health information system has become crucial, as it improves health system management, increases the quality of health care, helps in decision-making based on accurate information, and also helps in planning and following up on reaching planning goals, achieving universal health coverage, and reaching sustainable development goals. Without a health information system, it is difficult to monitor the health status of the population, predict epidemics early, and direct policies and resources efficiently.

In 2013, the Integrated Health Management Information System was established in Sudan with the aim of reducing duplication in reports and promoting a culture of information use among health workers and decision-makers and in order to improve the provision of health services. In 2016, the DHIS2 system for collecting digital data was introduced. This contributed to significantly improving the health information system, but after the outbreak of the war in 2023, a number of states were excluded from the coverage circle and the system became to operate in a limited number of states. This change that country has witnessed , necessitated a re-evaluation of the status of the health information system in Sudan, to identify the challenges it faces and the required needs, and to answer questions such as which states and regions are covered by the health system and whether the DHIS2 system currently in use covers all the information needs of the health sector, and to identify the extent of the private sector's presence in the system. This paper seeks to know the needs of the current system and its determinants to achieve a comprehensive health information system in Sudan.

2. Statement of the problem

Before the war, the health information system in Sudan played a pivotal role in the health sector and was relatively developed. However, it also suffered from several problems, the most prominent of which was its failure to include all sources of information. These problems worsened significantly after the war, and the health information system began to operate very weakly within specific states. To address these problems and restore the health system, therefore, defining the current challenges clearly and evaluating the limitations and needs was a prerequisite.

3. Importance of the study

The significance of this study lies in its contribution as a first step towards restoring and developing the health information system in Sudan, which enhances the management of the health system, the quality of health care, and good planning based

on accurate information and follow-up of the implementation of plans on the ground, as well as enhancing decision-making, achieving universal health coverage, and reaching the sustainable development goals.

4. Study objectives

This study aims to understand the current status of the health information system in Sudan and to identify the challenges and limitations it faces, while assessing the needs required to achieve an integrated health information system that unifies all sources of information and solves most of the current problems.

5. Study questions

This study attempts to answer the following questions:

- What is the current status of the health information system in Sudan?
- What are the challenges and limitations of the current health information system in Sudan?
- What needs must be met to access an integrated health information system in Sudan?

6. Methodology

Using a qualitative data acquisition method, semi-structured interviews were conducted with a number of stakeholders, participants in the health service delivery process, and specialists in health information systems in Sudan. Interviews were conducted with 20 experts in their fields to gain deeper insights into the challenges, opportunities and requirements needed to design an integrated e-health model in Sudan.

The areas covered in the interviews included medical specialists, pharmacists, hospital staff in the government sector, medical laboratory specialists, and health information systems experts working within the World Health Organization in Sudan.

The interview questions were prepared in advance and divided into categories, each of which answered one of the research questions and contained 28 questions, with an estimate of asking some questions during the course of the interview. All interviews were recorded with the participants' consent, then transcribed, analyzed, and similarities and similarities were extracted.

During transcription and conversion of recordings into texts, unhelpful words, repetitions, and nonverbal expressions such as laughter and side talk outside the framework of interview questions that did not contribute to adding meaning to the content were removed. The information was examined and re-verified, and then people's identities, such as names, institutions, or personal details, were concealed to maintain confidentiality.

Repeated readings of the texts were then made to identify patterns and ensure that the content was understood. Notes were written alongside texts to capture initial impressions, possible connections, and themes.

The result of this analysis was a good understanding of the status of the current health information system, an understanding of the status of the health system in general before and after the war, identifying current problems and obstacles.

7. Discussions and results

The researchers have found that there has been a very significant deterioration in the health system in Sudan after the war .Where A large number of hospitals and health centers have gone out of service. World Health Organization and humanitarian organizations estimate that 70–80% of health facilities/hospitals in conflict-affected areas are not operational or restricted. This indicates that up to two-thirds of hospitals in some areas are no longer operational. With this destruction of the health sector and displacement of the population, large numbers of paper medical records were lost and erased. This makes it difficult to retrieve patient information, track health history, provide ongoing care, and monitor disease outbreaks.

In turn, health information systems in Sudan were affected and lost a large part of their ability to monitor and follow up. The system relied heavily on paper records and statistical offices in hospitals and health centers, and the DHIS2 system at the state and federal levels of the Ministry of Health currently covers only 6 states.

Looking at the current situation, we find that the direct results on the status of the health sector and its health information system are:

- Data and information collection was disrupted, especially in states that were out of coverage.
- Destruction of health facilities and thus destruction of the paper health records contained therein.
- Loss of a large number of cadres and expertise in the health information sector as a result of displacement and migration outside Sudan.
- Weak infrastructure, including electricity, internet, and other health sector basics.
- Difficulty in planning and distributing resources due to lack of accurate data.
- Unfair distribution of the disease burden as a result of displacement and lack of information.
- Poor ability to predict epidemics or track the spread of diseases such as cholera due to the lack of information and decisions based on them.
- The real needs of society for medicines, equipment and health services cannot be estimated.
- Lack of funding.
- The absence of a number of sources in the process of collecting information, such as the private sector, medical insurance, and facilities affiliated with government agencies outside the umbrella of the Ministry of Health. These sources represent the largest percentage of health information.
- The lack of a unified mechanism for exchanging information between different

health institutions, as there are multiple sources of information, including official ones (federal and state ministries of health, government hospitals, health centers.) and informal (private sector hospitals, NGOs....) In addition to health facilities affiliated with the Ministry of Defense, the Ministry of Interior, and the General Intelligence Service, which do not fall under the umbrella of the Ministry of Health. Multiple sources of information in this way lead to duplication in data collection and delayed access to decision makers.

- Information that is raised from the lowest levels, such as government hospitals and health centers, is sometimes estimated and not accurate because it depends on collecting data in paper or manual form.
- Full reliance on paper records in most health facilities, with the exception of a very small number of private sector facilities that use electronic recording of patient information and are limited to basic and financial information only.
- The only approved system for collecting health information is DHIS2, which specializes only in collecting routine data, and patient details are not entered only as statistical numbers for patient frequencies and diagnoses.
- The states covered by DHIS2 for routine data collection are Red Sea, Nile River, Northern, Gedaref, Kassala and partial coverage of White Nile and Gezira states
- There are no unified policies for e-health systems.
- There is no unified mechanism for storing health data and information.
- Health information is loaded through different levels, and the collection process takes a long time and effort to complete.
- Collecting information requires a high cost represented by dedicated and specialized individuals to collect information and submit it to the competent authorities.

Together, these challenges and gaps in the health system in Sudan underscore the need for a more comprehensive and effective, integrated, developed system that

significantly covers the gaps and needs of the health system urgently, with the possibility of developing it through a clear strategic vision that takes into account the current situation in Sudan and the available capabilities.

Given the challenges facing the current health information system in Sudan and the shortcomings, there is an urgent need to lay the foundations for an integrated health information system that meets a set of needs, which are:

1- Unifying and integrating health information sources.
2- Introducing information sources that operate outside the umbrella of the health information system, such as private sector hospitals and medical insurance.
3- Trying to cover geographical areas that are not covered by the health information system.
4- Linking the Federal Ministry of Health's DHIS2 system with various electronic systems related to health institutions.
5- Creating a unified mechanism or model for exchanging health information in all health institutions at various governmental and private levels.
6- Gradual reliance on electronic systems, which in turn are linked to the unified system or model to ensure the integration process.
7- Opening comprehensive and unified files or records for patients through which the medical history is followed up and contains all details of diagnoses, treatments, examinations, and other information related to the patient.
8- Developing unified policies for health information systems.
9- Finding standards and a formula for storing health information electronically.

8. Recommendations

- Policies and standards must be established to control the health information system in Sudan.
- Providing a comprehensive model that unifies all health information systems, to

be adopted by the Federal Ministry of Health and implemented to meet all needs.

- Allocating budgets to develop the health information system in Sudan.
- Continue studies and research on how to unify and integrate the health information system.

9. Conclusion

This study concluded that the health information system in Sudan plays a pivotal role in routine information systems, but it does not include all sources of information and the inaccuracy of the information collected, as it is often estimated, relying almost entirely on paper records that do not contain all the information and expose them to loss and damage, which makes the process of retrieving health data difficult. There is also no unified mechanism for exchanging information between different health institutions There is only one approved system for collecting health information, DHIS2, which specializes only in routine data collection, and there are also difficulties in covering all geographical areas, especially rural and remote areas, which creates gaps in the availability of information and leads to weak ability to plan strategically.

These challenges indicated that there is a need to unify and integrate health information sources, introduce information sources that operate outside the umbrella of health information systems, especially the private sector, and create a framework through which health information is unified and exchanged, while linking the DHIS2 system to various health systems.

The study also recommended unifying all health information systems through a comprehensive model, developing policies and standards governing health information systems, and continuing studies to find ways to integrate all health information sources and systems.

10. References

1. Yas Al-Sultani, Hassan Zendan, Evaluate the importance of using the electronic health record, 31-10-2017
2. Tabrez Uz Zaman, Taher Mohammed Abdul Raheem, Ghassan Majed Alharbi, Moenes Faisal Shodri, Ahmad Hamza Kutbi, Sultan Mohammed Alotaibi, Khalid Salem Aldaadi, E-health and its Transformation of Healthcare Delivery System in Makkah, Saudi Arabia, 2018
3. World Health Organization, Assessment of Sudan's health information system 2020, 2020
4. Asere Gbenga Femi, Abdulrahman Musa Ali and Joseph Williams Enam, E- Health: A Comprehensive Overview, 17-07-2023
5. Zahra Galavi, Reza Khajouei, Yones Jahani, the role of e-health on the public knowledge and behavior in preventing COVID-19, 2023
6. Stefan TIRITEU, Aurora COSMA, Marcela PACURARU, Andreea ZAMFIR, Sorin CHIRVASE, Improved Healthcare Quality Through Integrated Hospital Management and Digitalization, 31-10-2024
7. Samar J Melhem, Shereen Nabhani-Gebara, Reem Kayyali, Leveraging e-health for enhanced cancer care service models in middle-income contexts: Qualitative insights from oncology care providers, 2024
8. Mehmet Koca, Feyza İnceoğlu, Serdar Deniz, Determining the relationship between e-health literacy and personal health system and patient satisfaction using structural equation model: an example of a training and research hospital, 2025