

Health Data Managers' Perceptions And Acceptance Of Health Management Information Systems

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Abstract

Background: All of the components of the healthcare system rely on accurate and reliable data to make educated decisions. The health information system provides the underpinnings for decision-making, which has four key functions: data generation, compilation, analysis and synthesis, and communication and use. Health Management Information System (HMIS) has the unlimited potential to enhance the quality of healthcare. However, technology can be implemented and still face resistance from users. Since the introduction of HMIS, studies are still scarce to assess its adoption and level of acceptance from the end-users' perspective. **The study aimed:** To assess the perceived usefulness and acceptance of HMIS by Health Data Managers (HDMs) in KSA. **Methods:** A cross-sectional study was co¹nducted using the Technology Acceptance Model (TAM) to assess HMIS usage. A mixed-method approach was used to collect data from 280 HDMs. Data analysis utilized descriptive statistics for distribution and ANOVA to test the correlations between perceptions, institutional factors, technology, and the acceptability of HMIS. **Results:** Perceived usefulness (PU), perceived ease of use (PEU), and technology factors were significantly inter-correlated with each other and with the acceptance of the HMIS system. The degree of HMIS acceptance by HDMs is at 64.4%. HDMs' perceived usefulness (PU) of HMIS highlights its core functionalities. **Conclusion:** The significance of HMIS usefulness and acceptance among HDMs is evident but requires further improvement such as continuous training on the use of Health Management Information System, making the system more user-friendly, increasing user support when needed, and ensuring timely communication of updates. HDMs acknowledge the positive influence of HMIS on their achievements.

Keywords: Health Management Information System, Health data managers, electronic health

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record, health information technology, HMIS acceptance, System acceptability.

Introduction

A management information system (MIS), one of the six building blocks of a health system, is essential for strategic planning, priority setting, and decision making ⁽¹⁾. In contrast to a paper-based system, electronic-health (e-health) provides timely and accurate collection of health data leading to better health care planning and improved diagnosis ⁽²⁾. Electronic health records are often classified into two main categories: individual (i.e., client) records and the records used for information management and decision making. The District Health Information System (DHIS) falls under the latter category of e-health which was first introduced by the University of Oslo in 1994 ⁽³⁾. A significant initiative under the umbrella of DHIS was the introduction of DHIS Version 2 (DHIS2) software ⁽⁴⁾. DHIS2 is an integrated, open-source and web-based platform for health data collection, validation, analysis, and presentation of aggregated and individual data ^(5,6). It aims to improve health service delivery by strengthening the health management information system (HMIS) ⁽⁷⁾.

Health information technology (HIT) presents a breakthrough for enhancing healthcare quality and safety, leading to cost reductions and facilitating innovations in services ⁽⁸⁾. When accompanied by behavior change of individual users, technological advances offer a great chance of dealing with modern health challenges ⁽⁹⁾. Health information system (HIS) has been recognized by the World health organization (WHO) and classified among the six building blocks of the health system ⁽¹⁰⁾. The acceptance of health information technology in the United State of America has been good since the introduction of HIT for economic and clinical health in 2011⁽¹¹⁾. The developing nations are quite lagging behind, yet they can learn from the experiences of developed countries to expedite IT adoption, saving time and resources ^(12, 13).

A health management information system (HMIS) is a way of recording, storing and processing health information for planning, policy making, implementation, monitoring and evaluation of health programs ^(14, 15). HMIS is viewed as a success in Low- and middle-income countries (LMICs) but its impact on the decision making in Africa and Asia are still limited ^(13, 15, 16). The factors such as Technology, institution, individual, and logistical abilities are perceived to affect realization of HMIS full potential. Other reports highlight lack of training, poor adoption, and under-reporting using HMIS as an issue in sub-Saharan Africa region ⁽¹⁵⁾. Behavioral and human factors play a significant role in the success or failure of a system, as factors such as changes in human behavior and system usage can predict whether users will accept and use the system or not ⁽¹⁷⁾ [16]. Therefore, the aim of this study was to assess the usefulness and acceptance of HMIS among Health Data Managers, practicing in health centers and hospitals.

Methods

A cross-sectional study was conducted from January to July 2022 in KSA. The study used a convenient sampling procedure to enroll HDMs. A convenient sampling is defined as a non-probability sampling approach where the sample of participants is selected and included in the study based on specific criteria such as easy availability to the researchers and their level of suitability to the research ⁽¹⁸⁾. For our study, the geographical proximity, availability at a given time of the data collection and the expressed willingness to participate in this research have been taken into consideration during a convenient sampling of the participants in this research

Health data managers who utilize the HMIS system for reporting healthcare data for at least six months or more, working in hospitals and health centers were eligible. Using the known population size with an acceptable error margin ($e = 0.05$), the formula resulted in an

appropriate sample size (n). Therefore, $n = N / (1 + Ne^2) = 230$ HDMs. The study used mixed methods to collect the data. Mixed method is a research strategy that involves both quantitative and qualitative approaches in order to achieve a comprehensive understanding of the study question⁽¹⁹⁾.

A questionnaire with two parts was used during data collection: one part of the questionnaire captured quantitative data using structured questions and the other captured qualitative data using semi-structured guides. The tool was initially developed in English and translated in Arabic as a local language. The tool was pre-tested to assess validity and reliability before being adopted for the study. Quantitative data was collected on HDMs' acceptance levels, their perceived ease of use, and the system's impact on their performance and efficiency during health data reporting while qualitative information was collected as complementary to explore health data managers' perspectives on HMIS as everyday users.

The construct validity and reliability of the research tool were performed using IBM SPSS Statistics 28 with details in **Table (1)**. Microsoft Excel was used to organize and process quantitative data and then analyzed using SPSS. Data analysis used descriptive statistics for distribution and ANOVA to test the relationships between the perceptions, institutional factors, technology and acceptability of HIMS. Qualitative data were processed, organized and analyzed using MAXQDA to find cohesion and quotations.

The study was approved by University. Before engaging participants in the research, participants were informed about the purpose of the study and were ensured confidentiality and voluntary participation in the study. The written informed consent form was signed by each participating participant prior to their participation. Responses are kept confidential and no name specification in the reports. All methods in this research were carried out in accordance with appropriate guidelines and regulations in the ethical declarations

Results

As detailed in **Table (2)**, male respondents were greater than females and accounted (53%). 78.3% of the respondents have held bachelors' degree and above. 97% of the respondents had a working experience of more than one year. 97.8% of the respondents were between twenty-five and forty-five years old during the study period.

The Perception of Health Data Managers Regarding the Usefulness of HMIS since its Implementation

The responses from health data managers were collected to assess their views on the usefulness of the Health Management Information System (HMIS) since its implementation. Some health data managers described how HMIS significantly save their time and hence improved productivity. "I use the HMIS system on a daily basis. It is highly beneficial and saves me a significant amount of time. For instance, when I require aggregated data, I can swiftly obtain the necessary reports, which would otherwise be time-consuming without HMIS." In addition, HDMs stated how using HMIS helps them to produce a real time, complete and quality reports. "I appreciate the contribution of HMIS to my work. It simplifies my job by generating comprehensive reports with high-quality health data."

HDMs are among high tasked staffs, and they defined HMIS as a useful tool that helps them to deal with high workload. "Data managers are often overwhelmed by excessive data and reporting demands. Thus, the use of HMIS in health data reporting enhances my job performance." Participants also described HMIS as reliable tool when reporting and managing health data. "HMIS is a reliable system to use. It makes our job easier with production of accurate, real-time, and high- quality reports."

Other participants expressed appreciation of HMIS and how it contributes to their

overall productivity. "HMIS is an incredibly useful system, making my work easier, quicker, and boosting my overall productivity." Then again, participants revealed their gratitude on how HMIS is accessible using various devices. "HMIS is highly practical in my workplace and can be accessed through any connected device, such as a telephone."

Suggestions from Health Data Managers to Ensure Future HMIS Utilization

The responses from health data managers were collected to capture their recommendations and what they propose to ensure future HMIS utilization and sustainability. Some health data managers recognize the role of continuous trainings as an important element for the future success of HMIS. "The HMIS system is beneficial and resolves many issues. To ensure the quality of reports and wider adoption of HMIS, it is crucial to provide quality training for data managers."

In addition, HDMs highlighted that developing a more easy to use and user-friendly interface would increase future utilization of HMIS. "The HMIS system is useful and easy to use, but its technology needs to be simplified and made more user-friendly." Participants also recommended for interoperable HMIS in the future. Since HDMs dealt with more other systems. It would make their works easier. "In the healthcare system, various systems are in use, and it would be immensely helpful if HMIS could seamlessly communicate with these existing systems."

Then again, participants suggested for timely supports and communication from HMIS support and management team. "We greatly appreciate the technical support provided by HMIS when needed. It is essential for this support to be sustainable. And timely communication and training on every update related to data management are necessary."

All the constructs employed in this study were found to be both valid and reliable. In **Table (1)**, all the modified TAM constructs used scored above .543 and .800 for loading factors (measuring validity) and Cronbach's Alpha analysis (measuring reliability), respectively, demonstrating the effective validation of the model. The accepted validity threshold is 50% (0.5), and the reliability threshold is .70 (70%). Therefore, all the constructs employed in this study were found to be valid and reliable.

This study determined the level of acceptance and usage of HMIS by health data managers. According to the B coefficient statistics, health data managers' perceived usefulness, ease of use, and technological factors positively influence their acceptance of HMIS usage. However, there was no significant relationship between institutional factors and the acceptance of HMIS usage by HDMs. As a result, the degree of acceptance is at 64.4% ($R^2 = .644$), which represents the variability explained by perceived usefulness, ease of use, institutional factors, and technological factors as detailed in **Table (3)**.

Table (1): Constructs validity and reliability

Tested Constructs	Number of items	Factors-Loading (Validity)	Cronbach's-Alpha (Reliability)
Perceived Usefulness (PU)	6	.631	.839
Perceived Ease of Use (PEU)	6	.773	.981
Institutional Factors (INST)	8	.926	.964
Technology Factors (TECH)	4	.543	.889
HMIS acceptance	6	.817	.800

Table (2): Demographic characteristics of study participants (N=230)

characteristics	N (%)
Gender	
Male	122 (53%)
Female	108 (47%)
Educational level	
Bachelor's and above	180 (78.3%)
Advanced level	38 (16.5%)
Secondary school level	12 (5.2%)
Age	
Below 25	4 (1.8%)
25-35	165 (71.8%)
36-45	60 (26%)
45 and above	1 (0.4%)
Working Experience (years)	
< 1	7 (3%)
1-5	87 (37.8%)
6-10	120 (52.2%)
10 and above	16 (7%)

Table (3): Level of HMIS acceptance and Factors that positively influence its acceptance

Tested Constructs	HMIS Acceptance		Spearman's Correlation
	ANOVA and Regression Analysis		
	Unstandardized coefficient	Standardized coefficient	
Perceived usefulness (PU)	.250*	.320*	.628*
Perceived ease of use (PEU)	.036*	.092*	.534*
Institutional factor (INST)	.009	.041	.081
Technology factor (TECH)	.433*	.397*	.621*
*P-value <0.001. R square: .644 *P-value <0.001			

Discussion

This study explored the impact of perceived usefulness, perceived ease of use, technological and institutional factors on the acceptance of the Health Management Information System (HMIS) by health data managers (HDMs). Our findings are consistent with several previous studies. A study conducted by Ahmed et al., (2020)⁽²⁰⁾ in Ethiopia found that factors like effort expectancy, performance expectancy, facilitating conditions, and social influence positively influenced the use of electronic medical records by healthcare professionals.

Perception of HMIS Usefulness by HMSD since Implementation

HDMs' responses regarding the perceived usefulness of HMIS emphasize its core functionalities, which include speed, increased productivity, effectiveness, simplification of tasks, and overall utility. Scholarly investigations on HMIS have demonstrated that effectively implemented HMIS can result in enhanced precision and timeliness in data collection, analysis, and reporting. As a consequence, this can play a pivotal role in optimizing resource allocation, bolstering disease surveillance, and shaping effective policy formulation ^(21, 22).

Factors Positively Influencing the Acceptance and Use of HMIS by HDMs

As described in **Table (3)**, the results from Spearman's correlation analysis confirm that health data managers' perceived usefulness, ease of use, and technological factors of HMIS are critical for the adoption of HMIS systems by health data managers. Although the TAM model used in this study does not suggest a direct relationship between institutional factors and system usage, a study conducted by Byungura et al., (2015) ⁽²³⁾ on SciPro system adoption shows a significant correlation between institutional factors, such as facilitating conditions, and system adoption. Barzekar et al., (2019) ⁽²⁴⁾ found that management and administrative support encouraged nurses to use the HIS leading to an increased level of perceived ease of use and usefulness and greater acceptance. They also highlighted training and the presence of technical support as important factors for user satisfaction and system adoption.

Training was similarly emphasized as a key factor in the adoption of any HIS by end-users in a study conducted by Nadri et al., (2018) ⁽²⁵⁾. Factors such as institutional, technological, individual, and logistical capacities have been shown to have a significant influence on HMIS implementation and sustainability in Africa ⁽²⁶⁾. To enhance system usage and acceptance, the usefulness and ease of use of HMIS, as well as technological factors like user-friendliness, reliability, accessibility, and interoperability, needs to be ensured.

Recommendations by HDMs to Ensure Future HMIS Use

HDMs recommend continuous training on the Health Management Information System, making the system more user-friendly, increasing user support when needed, and ensuring timely communication of updates. Nshimyiryo et al., (2020) ⁽²⁷⁾ assessing the accuracy of HMIS data for maternal and newborn health by comparing the consistency of HMIS reports with original facility documents, also propose ongoing investigations into data quality and the provision of training to bridge existing gaps. HDMs express their willingness to use a system that is both useful and easy to navigate. Therefore, during the design and development of the system, special attention should be given to maximizing system functionalities and technology. Addressing these recommendations can contribute to the long-term success and effectiveness of the HMIS.

Conclusion

In conclusion, the importance of HMIS usefulness and acceptance among HDMs is evident, yet there is room for further improvement. HDMs recognize the significant role that HMIS plays in their achievements. Factors such as Perceived Usefulness, Ease of Use, and technology are pivotal for the adoption of HMIS. Additionally, HDMs have recommended ongoing training, a more user-friendly system, enhanced technical support, improved interoperability, and timely communication of updates as key steps for the future enhancement of HMIS utilization. This study contributed to the scientific body of research in digital health transformation with insights on how HMIS tools are adopted. Further studies in this area could extend the context of a similar research by involving the leadership and decision makers at country level and also private healthcare providers.

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