

# The Reality of Using Health Information System in Libyan Health Sector

Rawda Aki<sup>1</sup>, Sumaya Yedder<sup>2</sup>, Sunds akki<sup>3</sup>

<sup>1,2</sup>Higher Institute of science and tecnology-Ghadames, <sup>3</sup>College of engineering technology Janzour  
[rawda.aki@histg.edu.ly](mailto:rawda.aki@histg.edu.ly), [sumaya.yedder@histg.edu.ly](mailto:sumaya.yedder@histg.edu.ly), [s.akk@cetj.edu.ly](mailto:s.akk@cetj.edu.ly)

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## Abstract

A variety of industries have moved forward and modernized through the use of information and communication technology (ICT). It has removed the limitations of space and time, making it simpler than ever to circulate information and deliver it anywhere in the world. Whether the user is an individual, a business, or even a state, using information and communication technology is no longer a luxury but rather an essential necessity that cannot be ignored.

It became necessary for the health sector to utilize this technology as numerous features of ICT use in the field of health services emerged in order to improve the quality of health services, especially with the rise in the number of patients and their needs.

This study focuses on how Libyan hospitals might employ health information systems (HIS) to provide better healthcare. In order to increase the possibility that these systems will be adopted and put into use, it also examines the challenges and barriers that may prevent their adoption.

As a result, the study sample supports HIS due to human skills, environmental pressures, competition, and adequate financial resources, indicating a strong support for modern systems.

**Keywords:** ICT, information and communication technology, HIS, Health Information Systems .

## 1. Introduction

Information and communication technology (ICT) has contributed to pushing the various sectors towards development and modernity. It has eliminated the barrier of time and distance, and the circulation of information has become easier than before and can be delivered anywhere in the world. The use of ICT is no longer a luxury, but rather an urgent necessity that cannot be dispense with whether the user is an individual, an organization, or even a state [1].

After the emergence of several aspects of the use of ICT in the field of health services, it became imperative for the health sector to use this technology in order to improve the level of health service, especially with the increase in the number of patients and their demands for a rapid response to their needs, as well as the shortage in the number of health workers and their poor geographical distribution.

In both advanced and developing nations, the use of ICT in health care helps fill the physician shortage. Telemedicine and other e-health applications are a good example. If implemented correctly, ICT has the potential to lower healthcare costs and open up new treatment and welfare options for patients [2].

In the Global ICT Report for the year 2015, the result clearly showed the position that Libya occupies globally in terms of the network readiness index, as it ranked 131 out of 143 countries in the world after it was ranked 138 out of 148 countries during the year 2014, and ranked penultimate in the Arab world, ahead of Yemen [3]. In Internet speed, Libya ranked 145th in the world with a flow rate of 6.25 MB, not far from Morocco, which came immediately after it, ranked 146th with a flow rate of 6.16 MB, then Mauritania ranked 162 in the world with a flow rate of 5.16 MB, and Tunisia with an average of 4.91MB stream ranked 166th.

Recently, when looking at the countries of the world, we see that storing and exchanging patient data between various health sectors and hospitals has become easy and uncomplicated. On the other hand, and unfortunately, because of the wars that Libya has gone through over the past years, and their effects still exist today, the health sector suffers from many problems in terms of technology, and from this standpoint this study came to see the extent to which health information systems (HIS) can be used and adopted in the Libyan health sectors.

## 2. Literature review

Some studies have indicated that e-health is still not approved in some developing countries, it is too early to adopt it, for several reasons, including the weak infrastructure of these countries and the lack of expertise in the technical field, in addition to the reluctance of some employees to use it [4]. A study conducted in Pakistan found that the adoption of e-health in its hospitals depends on several different factors, including ease of working conditions, the extent to which the available technology fits the required tasks in the system, trust and privacy. Plus, the social impact and the level of experience and innovation in the field of Information Technology [5]. As well as, Health workers in India have difficulty recording, arranging, processing and storing patient data while maintaining security and privacy, although Information technology applications have partially facilitated the work, but data exchange is not possible [6].

Additional studies have conducted on e-health in the Libyan health sector. First, A cross sectional study was conducted at Alkiesh polyclinic at Benghazi [7] in 2019 which aim to investigate some of the important barriers to implement electronic Health record (EHR). One of the main obstacles was the healthcare workers' lack of computer experience use and lack of knowledge about the EHRs system and unawareness of the widespread of the new technology. Another study [8] found that Libyan hospitals and clinics were not ready to implement e-health systems due to insufficient doctors, IT equipment, and sluggish Internet and telephone connections.

In Nigerian hospitals, a study found that the low level of education and lack of experience, in addition to weak organizational, administrative policies in these hospitals and lack of motivation have caused a decrease in the use of e-health applications. On the other hand, the opinion of specialists, as well as the popularity and desire of the staff in these hospitals has a significant impact on the extent to which the adoption and use of e-health technology is possible [4]. As well as in Ghana, a statistical study was done to see how ICT affected Tafo Governmental Hospital provided health services [2]. The findings indicate that the facility lacks adequate internet infrastructure and that the ICT infrastructure in the majority of Ghanaian hospitals is completely inadequate to accommodate the full functionality of the ICT systems. Although the majority of healthcare professionals have a positive attitude towards the possibilities of ICT they rate their skills as fairly good.

### 3. Health Information Systems in Libyan Health Sector

The ailing health systems collapsed as a result of the increased demand placed on them by the Libyan revolution in 2011 and its aftermath [9]. The National Health Systems Conference (NHSC) was sponsored by the Libyan Ministry of Health, the World Health Organization (WHO), and other international experts in the field between August 26 and 30, 2012, in Tripoli, Libya, to begin the planning process for re-engineering the health sector. This conference was held with the intention of studying international health systems and facilitating a consultative process among 500 Libyan health experts to identify and suggest potential solutions to Libya's health system issues. A portion of these proposals are establishment of a national information technology steering committee for the advancement of IT assets and foundation, preparing of ICT staff to work one next to the other with clinicians, train clinical staff, and foster their abilities for the effective usage of health information systems (HIS) that “integrate data collection, process execution, reporting, and use of information to

improve healthcare management” [10]. Trained staff are also needed for information compilation, analysis, and reporting.

According to WHO in Assessment Summary for Libya Data from 2013-2018 and Comprehensive assessment of Libya’s HIS 2017 [11] [12], there are not national unique patient identifier system, Institutional system of data quality assurance, and system of electronic capture of patient level health data in primary care health facilities and hospitals which is standardized and fully interoperable with aggregated routine HIS. There are also no effective review and action mechanisms, like independent data reviews, linkages between health sector reviews and diseases, and program-specific reviews. Additionally, the Health Information Centre lacks a unit for emergency information collection and processing as well as a unit for monitoring and evaluation. However, there is partially standardized system of electronic data entry at the district or comparable level.

Many researches presented study on Libyan HIS in hospitals or healthcare centers. Some of these studies have been conducted on the development of HIS in the health sector. First study [13] suggests using the OpenMRS framework to create a quick, low-cost, and open-source health information system. It is regarded as an electronic medical record on the network. It can be used to support small clinics in Sebha, Libya. Another study was conducted at Tobruk Medical Center [14], Libya to improve the HIS using the 3-layer graph-based model (3LGM) which is an already validated structured approach to HIS modeling and analysis to support information system managers.

Now, after twelve years of revolution, has there been any improvement in the use of HIS? Will we find a positive shift to the use of technology that contributes to the efficient completion of tasks? Do hospitals and health care centers use HIS that help save time and effort? This is what this study focused on, as a questionnaire was used and distributed electronically to groups of private and public hospitals and health care centers (H&HCCs).

#### 4. Research Method

This research is a cross-sectional survey design, which used to answer the research questions of the study. The study survey was conducted in private and public H&HCCs in Libya. In order to probe research questions, the research variables have been measured. These variables were measured using five-point Likert scale, ranging from (1) ‘disagree strongly’ to (5) ‘strongly agree’. The survey instruments were reviewed and validated by experts in the field of information system. Further a

coefficient of Cronbach's alpha stability was calculated using the SPSS program. The alpha coefficient for the questionnaire was "0.851", which is considered acceptable.

The target population for this study was the staff who are working in the private and public H&HCCs. According to the Information and Documentation Center in health ministry [15], Libya has 143 municipalities containing 1790 of the total public health facilities, 179 hospitals, 1356 primary health care centers and 255 health facilities classified under other. A number of electronic questionnaire forms were distributed to some of these H&HCCs in various regions of Libya, where (79) valid ones were returned for analysis from Libyan cities, and they are Ghadames, Tripoli, Misrata, Janzour, Sorman, Almarj, Sirte, Albayda, Shahat, Kufra.

The questionnaire consists of seven main parts. Part one questions on participants' demographic, part two about computer department in private and public sectors, part three Benefits of using HIS, Part four which is readiness of administrative in the health sector, part five about training, Next part is organizational and administrative obstacles, and part seven specific questions on using HIS.

## 5. Result and Discussion

The following results were obtained from a survey of the sample on the use of HIS:

### a. Demographic Characteristics

The section has dealt with the research sample's demographic characteristics, which are age, qualification, job title, experience, and public/private sector. According to Table 1, the majority of respondents (32.9%) were between the ages of 31 and 35. Moving forward, the bulk of responders (46.8%) were bachelors. There were (25.3%) administrative employees and (17.7%) nurses among the responders. In addition, 32.9% of respondents have 6-10 years of experience, while 30.4% have more than 16 years of experience.

Table (1) Demographic Characteristics

Job Titled	Consultant doctor	2.5%	Age	30 or less	26.6%
	Specialist Doctor	7.6%		31 – 35	32.9%
	Doctor	10.1%		36-40	5.1%
	Nurse	17.7%		41-45	12.7%
	nurse assistant	5.1%		46 or more	22.8%

	lab technician	3.8%	Qualification	Phd	2.5%
	pharmacist	5.1%		Master	6.3%
	Physical therapist	1.3%		Bachelor	46.8%
	administrative employee	25.3%		Diploma	36.7%
	Other	21.5%		High school	7.6%
Years of Experience	5 or less	12.7%	Health Sector	private sector	11.4%
	6-10	32.9%		public sector	88.6%
	11-15	24.1%			
	16 or more	30.4%			

#### b. Private and Public Sectors

Table (2) shows that (88.6%) of the sample is public sector, distributed throughout six cities, indicating that the majority of respondents are public sector. The remainder of the sample (11.4%) is distributed in the private sector throughout three cities (Tripoli, Misrata, and Janzour).

Table (2) Private/public sectors in cities

	private sector	public sector	Total
Ghadames	0	44 (56.41%)	44
Tripoli	6 (7.59%)	9 (11.39%)	15
Misrata	1 (1.28%)	3 (3.85%)	4
Janzour	2 (2.56%)	0	2
Sorman	0	2 (2.56%)	2
Almarj	0	4 (5.13%)	4
Sirte	0	2 (2.56%)	2
Albayda	0	2 (2.56%)	2
Shahat	0	2 (2.56%)	2
Kufra	0	2 (2.56%)	2
Total	9 (11.4%)	70 (88.6%)	79 (100%)

In addition, more than half of the respondents (73.4%) have knowledge of using computers, (63.24%) of them from the public health sector, as shown in Figure (1). Also, (50.6%) of respondents have previously attended training courses related to computers.

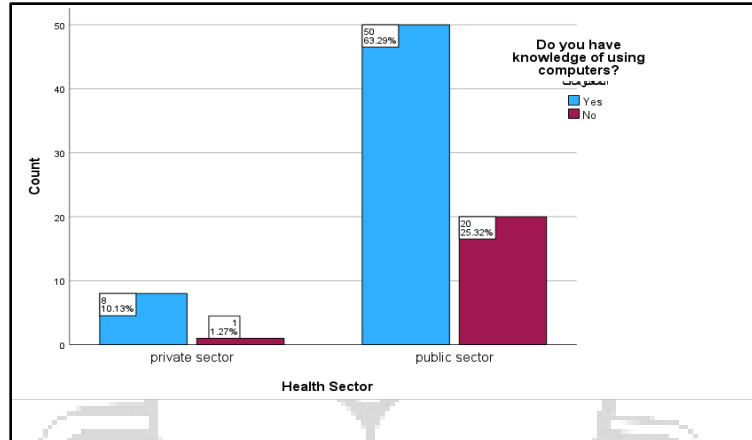


Figure 1. Knowledge of using computers in health sectors

Furthermore, it is obvious from Figure (2) that forty public sectors and six private sectors have a computer department, representing 46 (58.22%) of the sample individuals, with three private sectors lacking a computer department.

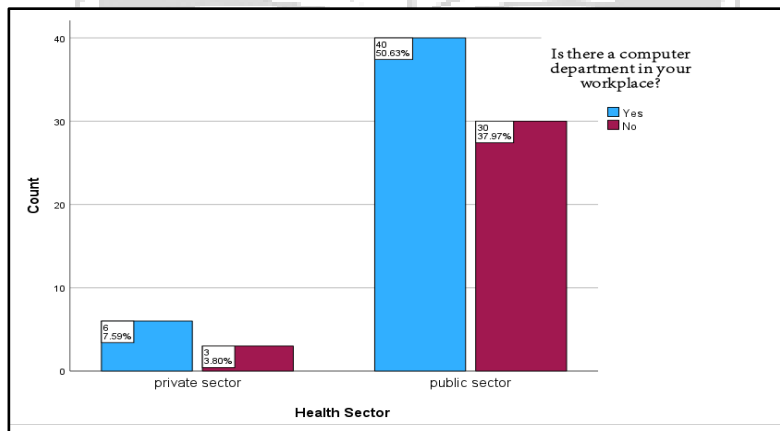


Figure 2. Computer department

Regarding the existence of a computer department in health centers, 58.23% of respondents report that health centers do not use HIS to enter and process data, with the public sector accounting for the majority (51.90%). As indicated in Figure (3), 36.71% and 5.06% of the public and private sectors, respectively, use HIS to process their data.

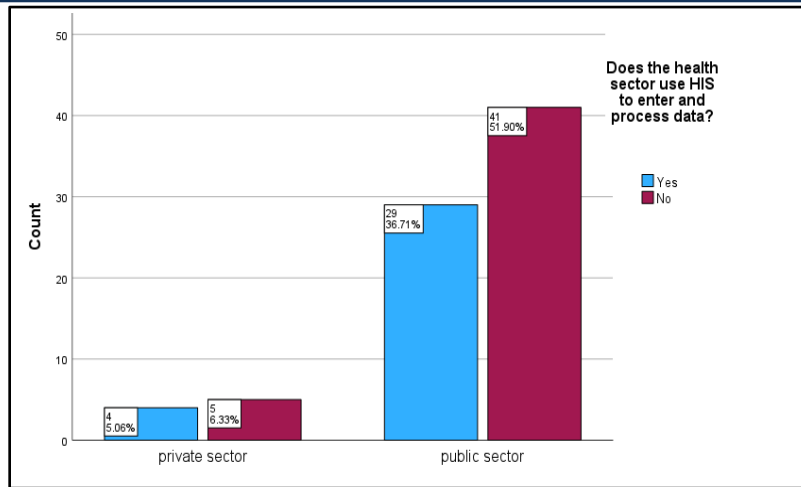


Figure 3. Using HIS in private and public sectors

### c. Benefits of HIS

In terms of HIS benefits, the first question resulted in table (3) that (39.2%) and (53.2%) of respondents agreeing and strongly agreeing that HIS is easy to save and retrieve data, respectively, with only (7.6%) neutral. The second question revealed that (39.2%) and (48.1%) of respondents agreed and strongly agreed that HIS saves time and effort, respectively, while (12.7%) were neutral. Furthermore, the average score for questions 1 and 2 is 4.46 and 4.35 on a 5-point scale, indicating that respondents agree that HIS accomplishes jobs more easily and swiftly.

Table (3) Descriptive statistical analysis of HIS Benefits

	Disagree strongly	Disagree	neutral	Agree	strongly Agree	Mean
1. Storing and retrieving medical data is easier electronically	-	-	6	31	42	4.46
	-	-	7.6%	39.2%	53.2%	
2. Health Information systems help save time and effort	-	-	10	31	38	4.35
	-	-	12.7%	39.2%	48.1%	

### d. Administrative Readiness in the Health Sector.

This section was formulated from three questions. Table (4) shows the percentage of each question in the administrative leadership readiness to use the HIS according to the Likert scale. The total in question 3 of (40.5%, 24.1%) is 64.6% of respondents agreeing and strongly agreeing, respectively, which indicates a lack of experience and skills among administrative leaders in dealing with HIS,



while only (2.5%) strongly disagree and (12.7%) disagree. The average score of questions 1, 2, and 3, respectively, is 3.59, 3.56, and 3.71, this reflects the lack of readiness of administrative leaders in the health sector to use HIS.

**Table (4) Descriptive statistical analysis of readiness of administrative**

	Disagree strongly	Disagree	neutral	Agree	strongly Agree	Mean
1.Low confidence of senior management in the ability of health centers to apply HIS	-	10	24	33	12	3.59
	-	12.7%	30.4%	41.8%	15.2%	
2. The administrative leaders' fear of increasing administrative tasks and burdens resulting from the application of HIS	-	13	26	23	17	3.56
	-	16.5%	32.9%	29.1%	21.5%	
3.A lack of experience and skills in dealing with information technology services among administrative leaders	2	10	16	32	19	3.71
	2.5%	12.7%	20.3%	40.5%	24.1%	

#### e. *Training and Rehabilitation*

To test the importance of training and qualifying staff for the use of HIS, a question was asked to the attendees, as represented in Table 5. The majority of the respondents (46.8%) strongly agreed and (39.2%) agreed, whereas (10.1%) were neutral and (3.8%) disagreed. Which means that most participants agree that training and rehabilitation are important elements to make staff engage in the use of modern technology.

**Table (5) Descriptive statistical analysis of Training**

	Disagree strongly	Disagree	Neutral	Agree	strongly Agree	Mean
1.Effective training of workers on modern uses of computers is an important element	-	3	8	31	37	4.29
	-	3.8%	10.1%	39.2%	46.8%	

#### f. Organizational and Administrative Obstacles

Regarding the existence of organizational and administrative obstacles to the use of HIS, the following questions were formulated, as shown in Table (6). The majority of those targeted agreed and strongly agreed that there are administrative and organizational obstacles that prevent the use of HIS, in terms of not reducing the use of paper, which leads to difficulty in inventorying reports, the lack of sufficient availability of computers and modern programs, and the existence of negative trends among some workers that the disadvantages of electronic work are many. Compared to its positives, the high cost of maintaining equipment, a shortage of trained, skilled technicians, and the few who responded disagree with the existence of obstacles.

**Table (6) Descriptive statistical analysis of Organizational and administrative obstacles**

	Disagree strongly	Disagree	Neutral	Agree	strongly Agree	Mean
Not facilitating and shortening administrative and routine procedures so that the use of paper is gradually reduced	-	3	13	37	26	4.09
	-	3.8%	16.5%	46.8%	32.9%	
The center faces difficulty in making an inventory of statistics and reports using the paper method	-	3	12	29	35	4.22
	-	3.8%	15.2%	36.7%	44.3%	
Lack of availability of modern computers, systems and programs that contribute to entering the electronic world and conducting modern electronic applications sufficiently	-	-	20	39	20	4.00
	-	-	25.3%	49.4%	25.3%	
The high cost of maintenance services for computers and equipment in light of the lack of skilled and trained technical hands	-	11	13	37	18	3.78
	-	13.9%	16.5%	46.8%	22.8%	
There are negative trends among some employees that the negatives of electronic work are more than its positives	2	4	25	32	16	3.71
	2.5%	5.1%	31.6%	40.5%	20.3%	

### g. Using of HIS

Table (7) shows the results of using HIS through the answers to questions. The total ratio (agree, strongly agree) amounting to 48.1% and 43.1% of the study sample strongly supports that HIS should be used in the health sector. In addition, 48.1% of the study sample agreed that the available human skills in the health sector are sufficient to use modern systems. Also, according to the total percentage of (agree and strongly agree), which amounts to 63.3% of the respondents, their health centers have a database sufficient to carry out electronic work, and they demand the use of HIS due to environmental pressures and informational and technical competition. Furthermore, 21.5% agreed and 20.3% strongly agreed among respondents, confirming the existence of allocated and sufficient financial resources for the application of HIS, however, 30.4% were neutral, 22.8% disagreed, and 5.0% strongly disagreed. With respect to the government, 38.0% of the respondents do not know if there is pressure from the government to develop technical systems and support development programs, while 31.6% agreed and 20.3% strongly agreed.

**Table (7) Descriptive statistical analysis of HIS using**

	Disagree strongly	Disagree	neutral	Agree	strongly Agree	Mean
The health center should use information systems, such as (ready-made systems that help save and refer to data)	-	5	2	38	34	4.28
	-	6.3%	2.5%	48.1%	43.1%	
There is an urgent need to implement HIS in the center due to environmental pressures and informational and technical competition	-	-	20	33	26	4.08
	-	-	25.3%	41.8%	32.9%	
The human skills available in the center are capable of using HIS	2	-	19	38	20	3.94
	2.5%	-	24.1%	48.1%	25.3%	
There is pressure from the government to develop technical systems and support development programs	-	8	30	25	16	3.62
	-	10.1%	38.0%	31.6%	20.3%	
The financial resources allocated	4	18	24	17	16	3.29

for the application of information systems are sufficient	5.0%	22.8%	30.4%	21.5%	20.3%	
The health sector has a database sufficient to complete its electronic work	2	8	19	34	16	3.68
	2.5%	10.1%	24.1%	43.0%	20.3%	

## 6. Conclusion

The development of computer information systems that can access and share data from hospitals in Libya has become an urgent need due to the paper system and the need to register patients when they are treated in another hospital. This has caused a waste of time, effort, and cost. For this reason, the use of health information systems (HIS) has spread in hospitals in most countries around the world. This paper examines the possibility of using HIS in Libyan hospitals to improve medical services. It also examines the difficulties and obstacles that may hinder the adoption of these systems in order to increase the possibility of their adoption and implementation. A large percentage of the study sample strongly supports the use of HIS in the health sector and believes that the available human skills are sufficient for modern systems. The largest percentage of respondents demand a health information system because of environmental pressures and competition, and financial resources are allocated and sufficient. The majority of study participants strongly support the use of health information systems.

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