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A questionnaire survey about doctor–patient communication: Study Cloud Computing Based Health Care System – Libya

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Abstract
Cloud Computing has introduced as a helpful approach in order to implement management and services more successfully. Technology Corporation beginning to adopts infrastructure, applications, and services of Cloud Computing at a considerable rate, to make it easily accessible to consumers, organizations and businesses. As the rate and level of utilization increases, organizations planning how best to control these investments and get most extreme advantage in enhancing the services of various sectors like banking, education etc. It is necessary to highlight its importance in the healthcare sector too. How cloud computing will affect the healthcare business. According to the challenge that facing healthcare sector, such as such as protecting patients health also improving communication tools between doctors and patients As well as to utilize cloud computing for enhancing the healthcare services in Libya. This is limited to Libya and specific architectural components of cloud computing i.e.: Software as a Service (SaaS) and Platform as a Service (PaaS) the quantitative approach has been followed which allowed using questionnaires. As well as improving communication between doctors and patients and this is an important aspect in improving healthcare services. Moreover making the healthcare records available online and accessible is also important to eliminate issues of loss of data

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Keywords: Cloud computing, healthcare issues, Questionnaires, doctors and patients, Software as a Service (SaaS), Platform as a Service (PaaS)

مسح استبيان حول التواصل بين الطبيب والمريض: دراسة نظام الرعاية الصحية القائم على الحوسبة السحابية – ليبيا

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ملخص

لقد تم تقديم الحوسبة السحابية كنهج مفيد من أجل تنفيذ الإدارة والخدمات بنجاح أكبر .بدأت شركة التكنولوجيا في تبني البنية التحتية والتطبيقات والخدمات للحوسبة السحابية بمعدل كبير. لجعلها في متناول المستهلكين والمؤسسات والشركات بسهولة. ومع زيادة معدل ومستوى الاستخدام، تخطط المنظمات لأفضل طريقة للتحكم في هذه الاستثمارات والحصول على أقصى استفادة في تحسين خدمات القطاعات المختلفة مثل البنوك والتعليم وما إلى ذلك. من الضروري تسليط الضوء على أهميتها في قطاع الرعاية الصحية أيضًا. كيف ستؤثر الحوسبة السحابية على أعمال الرعاية الصحية. وفقًا للتحدي الذي يواجه قطاع الرعاية الصحية، مثل حماية صحة المرضى وتحسين أدوات الاتصال بين الأطباء والمرضى بالإضافة إلى الاستفادة من الحوسبة السحابية لتحسين خدمات الرعاية الصحية في ليبيا. يقتصر هذا على ليبيا ومكونات معمارية محددة للحوسبة السحابية أي: البرمجيات كخدمة (SaaS) والمنصة كخدمة (PaaS). تم اتباع النهج الكمي الذي سمح باستخدام الاستبيانات. بالإضافة إلى تحسين الاتصال بين الأطباء والمرضى وهو جانب مهم في تحسين خدمات الرعاية الصحية. علاوة على ذلك فإن جعل السجلات الصحية

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متاحة عبر الإنترنت ويمكن الوصول إليها أمر مهم أيضًا للقضاء على مشكلات فقدان البيانات.

الكلمات المفتاحية: الحوسبة السحابية، قضايا الرعاية الصحية، الاستبيانات، الأطباء والمرضالبرمجيات كخدمة (SaaS)، والمنصة كخدمة (PaaS)

1. Introduction

Cloud computing is emerging in the current era to allow the software service providers and the customers use the systems anywhere around the globe. Cloud computing is nowadays used in context of mobile and thus is commonly known as mobile cloud computing. This can be supported by various mobile applications of banking, education, healthcare and shopping. The users only need an internet connection by which they can use the applications. To support the mobile cloud systems services are used from amazon, Google and Microsoft etc (Vacca, 2017).

Cloud computing is based on two types of clouds i.e: public and private clouds. Public cloud allows the software service providers to enable their user access the system publicly. An example is of Google, which provides the applications such as Gmail, Google drive. These are the applications being used publicly. On the other hand, the private cloud is based on a typical service and is used by companies who aim to provide services to a specific number of users. This might be a private company who is providing cloud based mobile systems to their users and the cloud is limited to only that number of users who are associated with that company (Patrignani & Kavathatzopoulos, 2016).

Thus, the need for cloud computing is emerging day by day and has contributed to the enhancement of various services of different domains. For e.g: e-banking applications are there which allows the users to access the accounts online anytime, anywhere via mobile. It includes the same features as the web applications. Before this, the customers used cheques and other techniques to use banking whereas now the mobile cloud applications have eased the tasks (Islam, et al., 2015).

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Similarly, we can take the example of e-learning which helps the students to get the lecture notes online and has eased the tasks of the lecturers who upload the data online. Before the use and deployment of these systems notice boards were used, which caused inconvenience for the students and lecturers also (González-Martínez, et al., 2015).

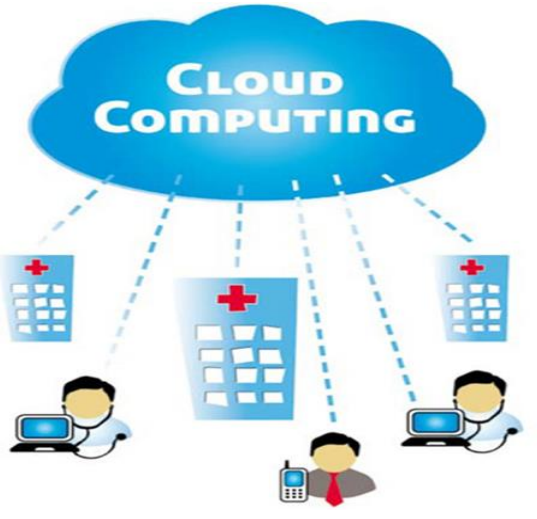

Figure 1: Presents adopting of a cloud-based in healthcare services source

Advantages of Cloud Computing

Flexibility for data access and device usage

Cloud computing allows the users to access the data anywhere around the globe by using any device like tablets, mobile phones etc. It's not necessary that the user should use a laptop or a computer system to access the data. For e.g: A user wants to access Hotmail while sitting at the airport. The user can access it and check emails on mobile device rather than using the laptop or any other available computer system. Due to this flexibility feature, cloud computing

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gains a competitive edge in market for not restricting the users' area wise or limited to devices (Al-Ahram, et al., 2014)

Data Updates

Cloud computing also consists of the feature of data updates. As soon as the device gets connected to the internet, the data on an application gets updated and a notification might be shown to the user. For instance, Facebook mobile application shows updates to the user when they are tagged in a post or when somebody is nearby them when they are roaming in an area. Another feature which can be considered for data updates of Facebook is the friend request which is sent by one user to another. A notification is generated when a user connects their device to the internet and hence the data updated on the server is shown to the user. Similarly, another common example is an email. As soon as the email is sent to a person, that person gets a notification on their mobile device (Avram, 2014).

Different Platforms Support

Cloud computing enables its users to operate the SaaS based systems run on different platforms like Blackberry, android, and iOS. There are various cloud based systems which are functional on the mentioned platforms. We can take the example of a well-known communication software 'skype'. It can be used on all platforms regardless if the mobile devices are connected to the internet. It will function the same as it functions on computer systems. This is a big advantage of cloud computing as it enables users to use the same software on different platforms (Buyya, 2013).

Data Backup & Reliability

Data backup is another feature that supports cloud computing for its usage. This enables the cloud computing users to get its services in a reliable manner. The reliability of it can be supported by the fact that cloud service provider has the data backup system which takes the backup of data at regular intervals. In case if a server goes down or malfunctions the data of users is always secure. So cloud computing is a reliable source for its users (Bauer & Adams, 2012).

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Low in Cost

Cloud service providers provide services at a reasonable cost which are affordable for the cloud service providers. This helps the software service providers deploy their systems on cloud servers, by paying at a reasonable price and using reliable services which enhance the chances of their increase in business when their clients use reliable applications (Sahinoglu, et al., 2015).

Overview of Healthcare Issues in Libya

Healthcare issues in Libya have always been a major concern for the Libyan government. The healthcare issues in Libya are becoming greater day by day. Hospitals in Libya are becoming overcrowded by patients thus creating problems for the doctors to deal a large number of patients at a time. This also causes inconvenience for the patients as they do not get on time treatments due to which the death rate is increasing. Furthermore, they have to visit private hospitals which are sometimes not in the range of those patients who are financially not strong (Bendardaf, 2014).

According to various studies, it is reported that the healthcare sector in Libya is being privatized due to the governmental issues and insufficient funding for the healthcare sector. This is causing difficulties for the patients as it is mostly difficult for patients to approach private hospitals. Due to this reason, patients do not get treatments on time or they get insufficient treatments. Due to insufficient treatments, the diseases prolong and the patients have to suffer a lot (Sladkevicius, et al., 2013).

The Libyan government has spent around 0.85% of Gross Domestic Product (GDP) for the improvement of healthcare services but still the improvements are far away to be considered. There is a need for the utilization of information technology for improving the healthcare sector in Libya. Therefore, the issue being highlighted is the cost of implementation of IT infrastructure which is not affordable by the government of Libya (Vilog & Ballesteros, 2015). As the healthcare sector's circumstances are going worse day by day the patients have started taking medications on their own risks which have started causing other problems like generation of new

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diseases etc. The patient's usually take home made medicines which are not sufficient for curing the disease which is another cause for the increase in death rate.

Libya is also victim of various diseases. The main causes of death which were reported in 2012 were 37% cardiovascular diseases, 13% cancer, 5% diabetes and road accidents are reported to be 11%. Therefore, for the cure of these diseases, the healthcare sector needs to be efficient enough to resolve these issues. Due to the limited supply of drugs, the medicinal drugs become out of the range of patients and they do not get the treatment on time which is also a cause of death rate in Libya. According to a Ministry of Health report, there were 10 230 doctors (17/10 000 population) in February 2009, of which 84% were nationals. Libya had 96 hospitals (20 289 beds), 25 specialized units (5970 beds), 1355 basic health centres, 37 policlinics and 17 quarantine units (Organization, 2015).

The Questionnaire

The Questionnaire is known to be the most common way of gathering views of people and get specific answers to the questions. Getting relevant answers to the questions will make it easier for the researcher to do a good analysis (Kumar, 2015.The Questionnaire will be comprised of a couple of questions related to the healthcare issues in Libya and cloud computing awareness. They will be created on Google forms as Google forms are one of the common sources of usage resolving many problems .

Google forms provide features such as mobile friendly interface, email notifications of the results, and creation of various forms. These are some of the features which have to lead the researcher to use Google forms (Chuah, 2016).

Methodology

There are basically three types: Qualitative, quantitative and mixed method approach. The research approach which is going to be followed is quantitative. quantitative approach will be used will enable to verify that how cloud computing has affected the healthcare sector in Libya.

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Data Collection

The data is collected from the doctors who are usually experienced in their areas of specialization and are facing the issues in dealing with patients. Awareness of cloud computing/IT is also covered in the questionnaire and any hurdles which can occur while implementing cloud computing in healthcare has also been discussed.

Tools for Data Collection

The data is collected from questionnaires, reviewing the published work and interviews. Therefore, data collection can be divided into the categories: primary data and secondary data. The primary data consists of the information obtained from sources such as survey questionnaires and other techniques which help in justification of the solution proposed for the problem. Whereas secondary data consists of the sources such as journal articles, research papers and various other resources which help identify the solution of the problem (Thomas, 2013).

Population and sample

the target population is the doctors of Libya working in hospitals and around 50 responses are targeted for the questionnaires which are going to be distributed in eight hospitals in Libya which are. Tripoli Medical Centre, Saint James Hospital , Al Jalaa Children Hospital, National Centre for Diabetes Endocrinology, Al Hawary Hospital, Benghazi Children Hospital, Ibn Sina Clinic, Benghazi Medical Centre.

Questionnaire Design

The respondents which are targeted are the doctors which are working in hospitals. The data for the survey has been collected from doctors who are facing the issues of lack of communication for appointments and treatments. The questions designed are understandable and easy to make sure that those people who have language issue may also be able to give their response The questions are listed below along with reasons that why they are being asked:

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Table .The questions along with reasons.

The Questions Questionnaire Design	
1 What is your age?	10. Do you think that the proposed mobile cloud computing solution will help you communicate with patients when you are distant apart?
2. What is your gender?	11. What issues can be considered critical while deploying the mobile cloud computing for hospitals
3 What is your qualification?	12. Do you think that mobile cloud computing, when implemented for patients, will help them seek medications in a systematic manner?
4. What is your department in which you are working?	13. Do you think that patient record security is an important factor while deploying cloud computing infrastructure
5. Is the current healthcare system of Libya satisfactory?	14. Do you think that before introducing this solution awareness related to cloud- based systems needs to be created?
6. Is there any current mobile system being used in Libya for recording patient's data?	15. Do you think that this cloud computing solution needs to be followed for rural areas too?
7. Do the paper-based records create difficulties for doctors while maintaining them?	16. Do you think that this cloud computing solution will help at clinical level too if implemented for it?
8. Do you think that implementation of mobile cloud computing will help the doctors in maintaining patient records?	17. Do you think that this system will also help for doctors working as specialists?
9. What issues are being currently faced by you while examining the patients?	18. Do you think that this cloud computing solution will help improve patient-doctor communication when there are a large number of patients to attend?

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Results

Questionnaire Analysis

The analysis from the questionnaires covers the issues which doctors are facing in treating the patients. Awareness of cloud computing/IT is also covered in the questionnaire and any hurdles which can occur while implementing cloud computing in healthcare has also been discussed. Focus has also been laid on getting an opinion of doctors that will the implemented solution help them or not.

1. What is your age?

Table2.Ages

25-35	35-45	45-55	55 and above
23%	27%	20%	30%

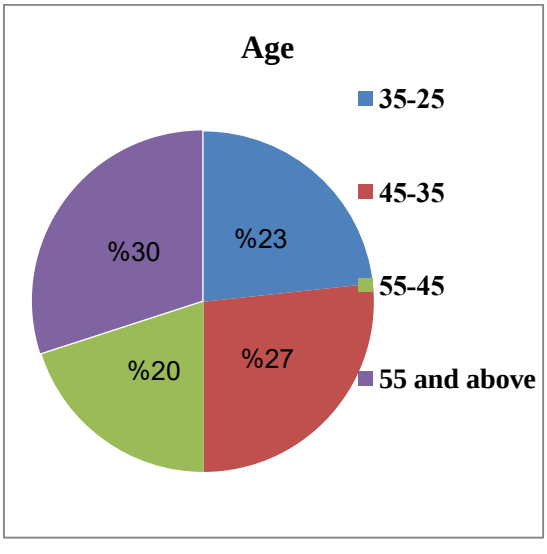

Figure 2. Ages

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2. What is your gender?

Table2.Gender

Male	Famel
50%	50%

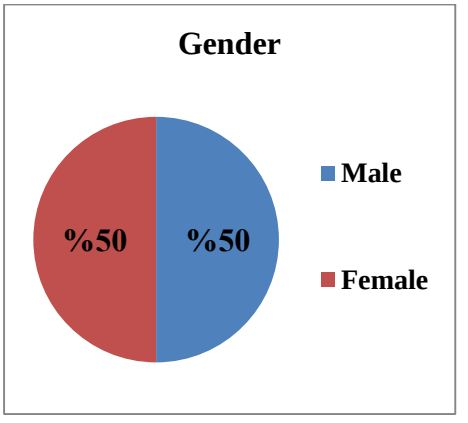

Figure 3. Gender

3. What is your qualification?

Table3. Qualification

Ph	Master	Bachelors
40%	33%	27%

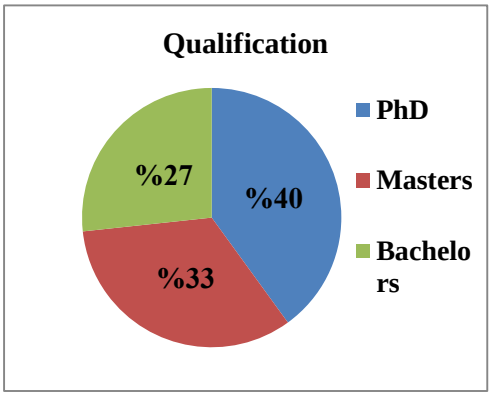

Figure 4. Qualification

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4. What is your department in which you are working?

Table 4. Hospital Departments

Emergency	Cardiology	Orthopaedics	Radiology
34%	30%	23%	13%

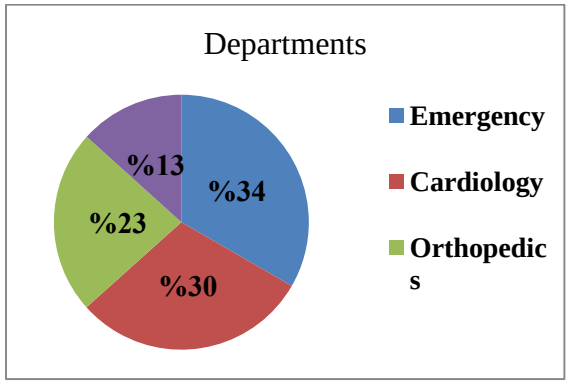

Figure 1. Hospital Departments

5. Is the current healthcare system of Libya satisfactory?

Table 5. Healthcare System Satisfaction

Strongly Agree	Agree	Strongly Disagree	Disagree
7%	-	37%	56%

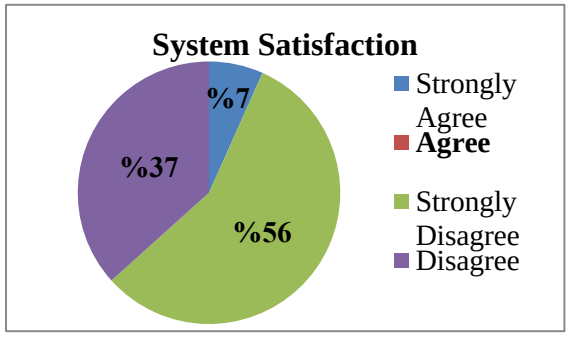

Figure 2 .Healthcare System Satisfaction

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6. Is there any current mobile system being used in Libya for recording patient's data?

Table 6. Mobile Systems Usage

Yes	NO
14%	86%

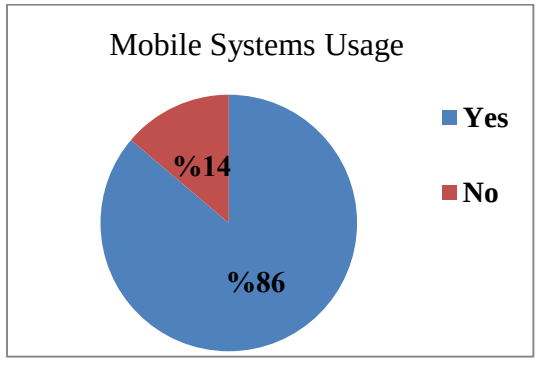

Figure. 3.Mobile Systems Usage

7. Difficulties while using paper based records

Table 7. Difficulties while using paper based records

Strongly Agree	Agree	Strongly Disagree	Disagree
20%	80%	-	-

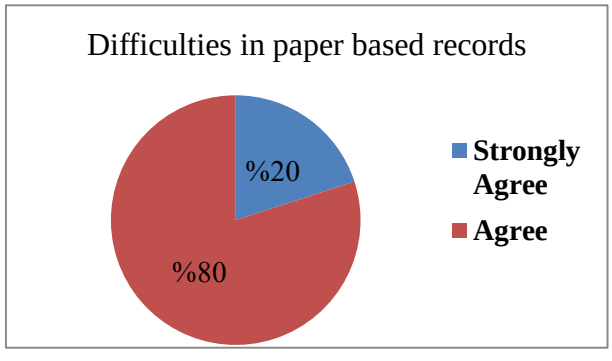

Figure 4. Difficulties while using paper based records

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8. Implementing Mobile Cloud Computing

Table 8. Implementing Mobile Cloud Computing

Strongly Agree	Agree	Strongly Disagree	Disagree
20%	80%	-	-

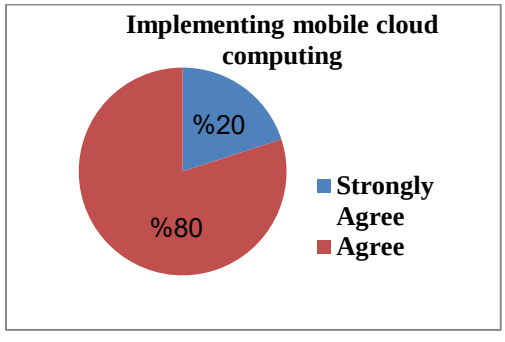

Figure 5. Implementing Mobile Cloud Computing

9. Issues While Examining the Patients

Table 6. Issues While Examining the Patients

No time for consultation	Loss of medication history of patient	Unable to maintain the record of patients	Unable to find out the record of a patient when needed
3%	33%	47%	17%

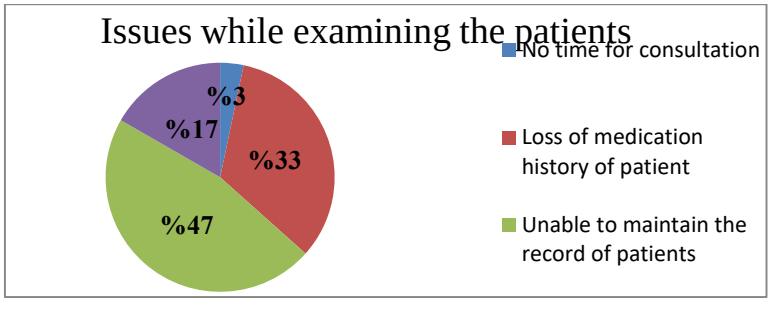

Figure 7. Issues While Examining the Patients

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10. Improving Communication when Distant Apart

Table 10**. Improving Communication when Distant Apart**

Strongly Agree	Agree	Strongly Disagree	Disagree
20%	80%	-	-

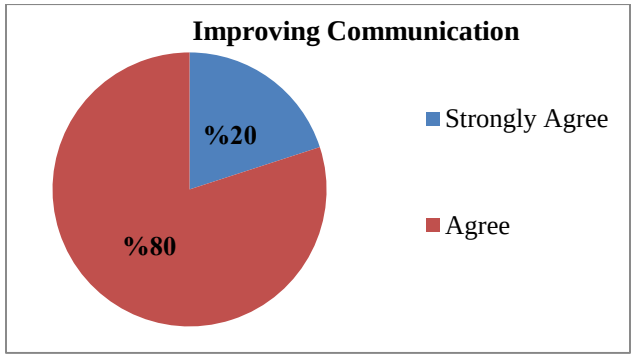

Figure 8. Improving Communication when Distant Apart

11. Issues considered while deploying cloud based system

Table11. Issues considered while deploying cloud based system

Governmental issues	Deployment cost of technology	Lack of awareness of IT	None of the above
37%	43%	17%	3%

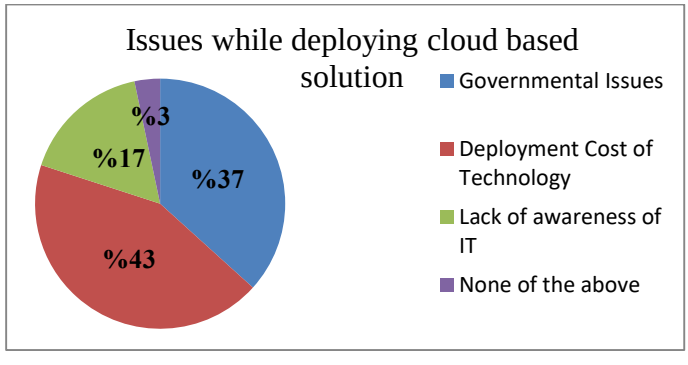

Figure 91.Issues considered while deploying cloud based system

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12 .Seeking Medication in a Systematic Manner

Table 12. Issues considered while deploying cloud based system

Strongly Agree	Agree	Strongly Disagree	Disagree
3%	67%	-	30%

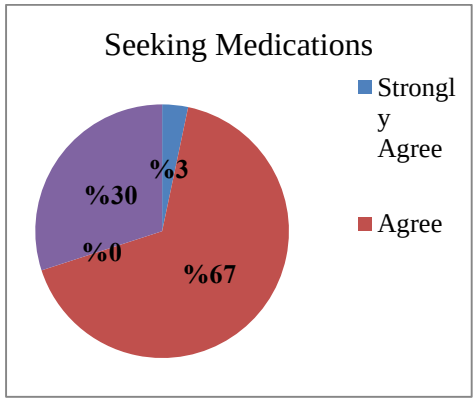

Figure 10. Seeking Medication in a Systematic Manner.

13 .Cloud data security

Table11. Issues considered while deploying cloud based system

Strongly Agree	Agree	Strongly Disagree	Disagree
3%	52%	7%	38%

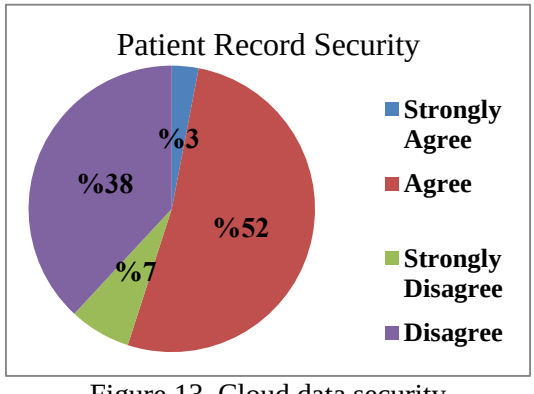

Figure 13 .Cloud data security

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14 . Cloud Systems Awareness before System Deployment

Table14. Cloud Systems Awareness before System Deployment

Strongly Agree	Agree	Strongly Disagree	Disagree
3%	67%	-	30%

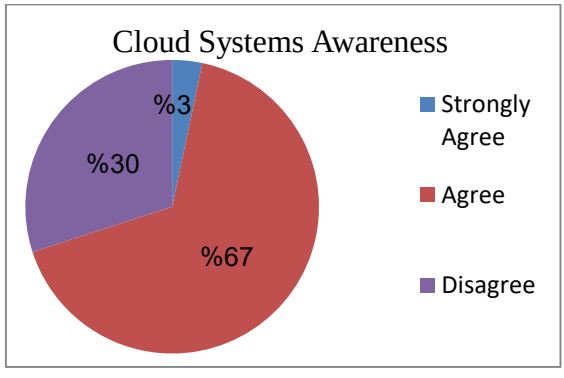

Figure 11. Cloud Systems Awareness before System Deployment

15. Cloud System Implementation in Rural Areas

Table15. Cloud System Implementation in Rural Areas

Strongly Agree	Agree	Strongly Disagree	Disagree
-	47%	10%	43%

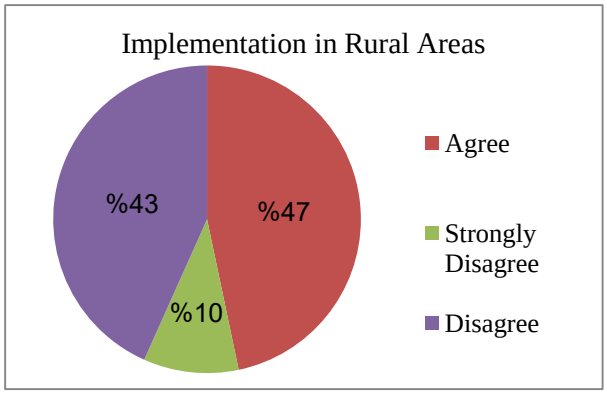

Figure 12. Cloud System Implementation in Rural Areas

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16. Usage of cloud based system at clinical level

Table16. Usage of cloud based system at clinical level

Strongly Agree	Agree	Strongly Disagree	Disagree
7%	86%	-	7%

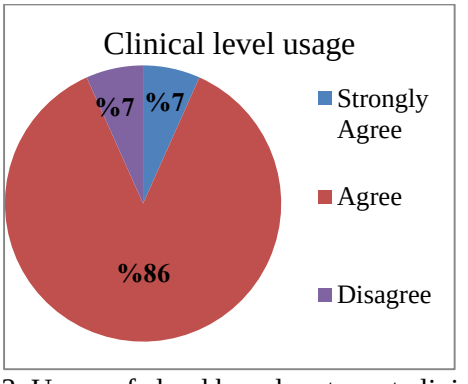

Figure 13. Usage of cloud based system at clinical level

17. Usage of system by doctors working as specialists

Table17. Issues considered while deploying cloud based system

Strongly Agree	Agree	Strongly Disagree	Disagree
10%	83%	-	7%

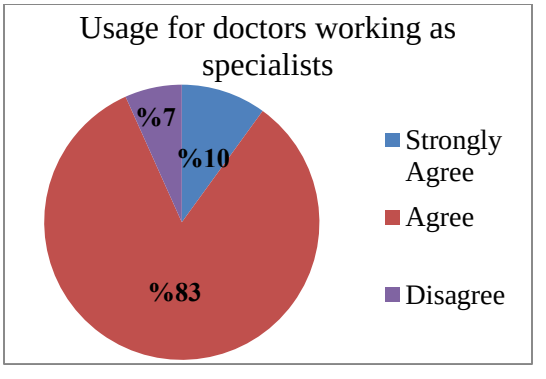

Figure14.Usage for doctors working as specialists

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18. Improving patient and doctor communication using the cloud based system

Table18. Improving patient and doctor communication using the cloud based system

Strongly Agree	Agree	Strongly Disagree	Disagree
20%	77%	-	3%

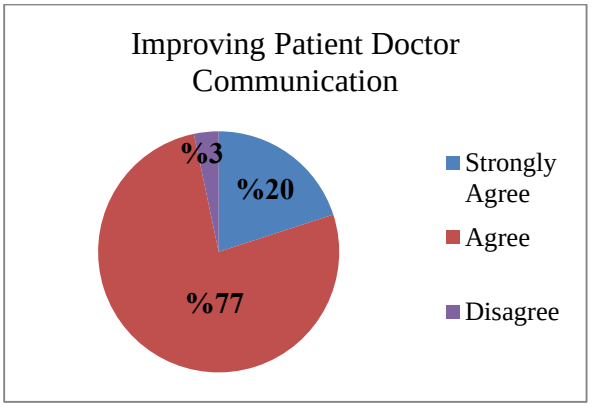

Figure 15. Improving patient and doctor communication using

Conclusion

It has conducted a comprehensive analysis on the data received from questionnaire. The rationale behind data collection is to know doctor's perspective towards the current state of the healthcare sector in Libya. For getting reviews on the implementation of the cloud based system. The questions are designed to keeping in view the importance of the health record system and take into consideration the problems of health care sector of Libya. The increasing number of patients is requiring maintaining a large number of records of patients which has become a great challenge for the healthcare sector. With the analysis of the quantitative, it is noted that majority of the respondents are not satisfied with the healthcare sector and are in the favour of the implementation of cloud-based system. The received analysed responses favour of the implementation of the system at the clinical level and for doctors

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who are working as specialists too. This also depicts that respondents are aware of the importance and usage of cloud -based systems.

Recommendation

The proposed method has several limitations. Firstly, the sample size in this study was limited; thus, a higher number of samples should be considered to obtain complementary explanatory abilities for multifaceted and specialized assessment research. Next, the outcomes obtained in this study should be verified with more samples.

This is a study that may not be applicable in other countries with different health systems and legislation. Future studies can consider additional multiple criteria approaches .to evaluate the influence of health cloud computing system.

Numerous approaches, such as longitudinal studies, can be used to determine the factors related to the adoption of an health cloud computing system in future research

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