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Essential Factors for Adopting Hospital Information System During Covid-19 Pandemic: A Case Study from Palestine

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Thesis Approval

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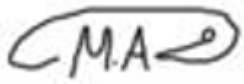
1. Supervisor: Dr. Mohammed Moreb	….  ….
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Declaration

The work provided in this thesis, otherwise referenced, is the researcher's work and has not been submitted elsewhere for any other degree or qualification.

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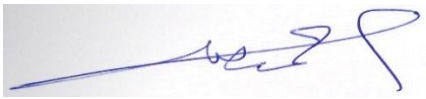
Signature: 

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Dedication

I dedicate this work to Allah, Lord of the world, my family, and everyone who helped me and believed in my abilities to achieve this degree and complete this work.

Acknowledgement

In the beginning, I thank Allah and praise Him in a manner that befits the infinite number of His creation, and as it pleases Him, for supporting me in completing this work.

I would like to express my gratitude to my supervisor Dr. Mohammed Moreb for supervising my work and providing support and guidance throughout the research. Dr. Mohammed Moreb kept me focused on the thesis. Due to his patience, I have learned invaluable research methods and technical writing lessons. Their genuine interest and passion for the research topic have been an inspiration.

My most enormous gratitude goes to the most important person in my life, my mother. You are everything to me. Thank you for your praying. My father, may God have mercy on him. I know he is with me; you were and still are my idol all my life.

My lasting gratitude to my wife and children who have experienced years of lost leisure time without me, in addition to the extra workload as a consequence. I probably never be able to repay this to them or be able to regain the time lost.

Special thanks to my dearest friends and colleagues for their help and encouragement.

Also, I thank the staff of the Health Informatics program and AAUP for giving me the chance to prepare for this study. I mustn't forget to thank the Ministry of Health in Palestine and the Hospitals' staff who filled the out questionnaires. Finally, I would thank everybody who helped and encouraged me to complete this study.

Abstract

Introduction

Improvements to HIS must be made to help with workflow and patient treatment by introducing new knowledge to adapt and change toward one direction; which is the best to health issues. Although Palestine has quickly and effectively responded to the outbreak of COVID-19, the hospital's health information systems in dealing with Covid-19 patients require more research. This is the first time, as far as the researcher knows, such a study worldwide handles the Covid-19, HIS, and hospitals all together for creating creative solutions for particular health diseases. The primary purpose of this research is to explore the perceptions of HIS users on the essential factors affecting adoption. It also aims at updating or upgrading HIS systems during the COVID-19 pandemic in government and non-governmental hospitals. It is vital to understand the tools used in HIS hospitals and the acceptance of patients and hospital manager boards, reacting to these computerized platforms to enhance patient treatment and deal with the patient record.

Methods of the Study

This study covered ten governments and thirty governmental and non-governmental hospitals in Palestine. Data was collected by mixed methods, quantitative (questionnaire) and qualitative (semi-structured interviews). The two tools were used to obtain information needed from Direct Managers, Staff, and IT managers. A total number of (212) questionnaires was received. The researcher employed a cross-sectional approach in this thesis, simultaneously gathering data from many locations. Moreover, interviews were conducted between 6/11/2021 and 11/1/2022. Qualitative questions were discussed with the 15 participants. The researcher analyzed and understood the Palestinian hospital's systems for two types: health information systems (HIS)

and non-electronic systems. Tests used for the analysis were T-test, Anova, p-value (0.05). The essential factors of organizational factors (e.g., Support from Senior Management), environmental factors (e.g., Government and Competitors' Pressure), and technology factors (e.g. Compatibility, Security and Safety) and its relationship with adopting HIS during COVID-19 were analyzed.

Results

A total number of (211) questionnaires out of (212) the total number of questionnaires received. The research sample is 30 hospitals, 29 visited (97%). Hospitals are separated (Hospital Type) into 18 Public hospitals (60%), 6 Private hospitals (20%), and 5 NGO hospitals (17%). One hospital was not visited (3%). For the 29 hospitals (Current HIS 'Name'), the researcher found that 15 (52%) hospitals use 'MOH Purchase' HIS, and 6 (21%) hospitals use 'Purchase' HIS. Finally, 8(28%) hospitals use 'Manual' HIS.

The study found that essential factors affecting adopting HIS were organizational factors with sig value (0.072), environmental factors with sig value (0.041), and technology factors with sig value (0.011). All parameters influence the adoption of HIS in the face of Covid-19 ,which is best applied to government-run hospitals.

Conclusion

This study is the first study in Palestine that highlights the urgent need to link all hospitals and HIS together to stand against Covid-19. In the same fashion, linking them helps improve the hospital's compatibility with the HIS adoption and usage against Covid-19 and raises the level of all staff training of complete HIS use to understand the technology factors better. Must connect the HIS program with Government strategic plans, which will be the MOH orders.

This is one of the best ways to gain people's trust. Finally, the researcher recommends conducting a study on the impact of the essential factors of hospitals on a large scale in Palestine or other countries. It is worth mentioning that the number of factors mentioned in this study is seven factors.

Keywords

Hospital information system (HIS); technology organization and environment (TOE) framework; Covid-19, public hospitals; Private Hospitals, NGO Hospitals, Palestine, Essential Factor.

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List of Abbreviations (Acronyms)

AAUP: Arab American University of Palestine

AHP: Analytical Hierarchy Process

COVID-19: coronavirus disease 2019

ECDC: European Centre for Disease Prevention AND Control

ED: Emergency Department

eHealth: Electronic Healthcare

EHR: Electronic Health Record

EMR: Electronic Medical Record

EFAHIS: Essential Factors for Adopting Hospital Information System

HIS: Health Information System

HOT: Human Organization Technology

ICT: Information and Communication Technology

ICTV: International Committee on Virus Taxonomy

ICU: Intensive Care Unit

ID: National Identification

IS: Information System

IT: Information Technology

ITS: Information Technology Services

LTSCs: living and treatment support centers

MNIS: Mobile Nursing Information System

MOH: Ministry of Health

mHealth: Mobile Health-Care

PMOH: Palestine Ministry of Health

PMR: Patient Medical Record

RdRP: RNA Dependent RNA Polymerase

SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus-2

SPSS: Statistical Package of Social Science

TOE: Technology, Organization, Environment.

USA: United States of America

USAID: United States Agency for International Development

VOC: Variant of Concern

VOI: Variant of Interest

WB: West Bank

WHO: World Health Organization

Chapter One: Background Context

1.1 Introduction

Research on hospitals has a long tradition. Offering creative and novel health solutions has become an urgent need on the discussion table. For example, Mobile healthcare (mHealth) was replaced by (eHealth) electronic healthcare in many hospitals. Recent reports state that eHealth can improve patient interactions, health care, and Quality of life (Moreb et al., 2020). Patient Medical Record (PMR) changes due to the normal movement over the years. Having this in mind, this change is to make hospitals ready and adaptive to meet incoming patients, cases, data, and knowledge. A recent study completed by Bae et al. (2020) found that in the face of a novel infectious disease, improvements to HIS must be made to help with workflow and patient treatment (Bae et al., 2020)

Most research stated that the COVID-19 is considered a vast worldwide issue. Thus, the growth of (HIS) health information system is starting to occur in neighboring and developing countries. Moreover, it is becoming essential to plan the development strategically. This requires correct and durable pillars.

The health information system provides a database for people’s details, which helps find a particular person with their details. As an illustration, each person registered to the system with their complete information such as National Identification (ID), the full name, mother's name, gender, birth date, birthplace, address, mobile and telephone number. Therefore, it is easy to find that you can search for a certain person by any entered details. This yields each patient's medical record, which reflects every medical thing done on the patient's electronic file, whether he is an outpatient, inpatient, or emergency patient.

All orders ordered to the patient by the doctor, either laboratory, radiology, or drug orders, are done on the system and documented by date and time. The results are also on the system, so there are no missing results. Different statistics on various populations allow you to create additional reports that reflect how many admissions (patients visited the hospital) in a certain

period. You can find them in different criteria depending on their gender, age, diagnosis, address, and so forth to ease the medical researcher's work.

All mentioned reduces the burden on medical staff since they can easily reach the medical data they need. Moreover, the system reduces the load on patients, so less and maybe no more paper shown in their hands, no more files missing, and everything is documented and saved.

Recent theoretical developments have revealed that there are stun efforts from HIS to support multiple clients. A wide range of purposes can be summed as the generation of technology to allow decision-makers at any level of care to identify issues and needs. Based on the preceding, it is essential to start making evidence-based health policy decisions and optimally allocate scarce resources. Data from various sources are used for multiple objectives at different levels of the health care system. In addition, HIS provides more tools to summarize and measure based on improved standardized indicators for analyzing data quality and overall system performance. The score is generated from publicly available information using standard measures to provide objectivity and comparability across time and nations (Kitsios et al., 2020).

Having all these things together, the primary purpose of this research is to explore the perceptions of HIS users on the essential factors affecting adopting, updating or upgrading HIS systems during the COVID-19 pandemic in government and non-governmental hospitals.

1.2 Problem Statement

The health system did face an enormous situation. Covid-19 is widespread all over the world. In several nations, the ongoing COVID-19 pandemic has stretched global healthcare capability to a breaking point (Chandrasekaran & Fernandes, 2020). This pandemic prevented hospitals from essential healing and giving treatment to patients. They must be prepared for Covid-19 cases. The COVID-19 patient order is prepared and then sent to Emergency Department (ED), pharmacy, and hospital care unit (ICU) if patients present with serious enough symptoms to

require more clinical testing. For chronically sick patients and others at risk of serious illness, optimal supportive treatment requires oxygen and ventilation for critically ill patients (Coronavirus Disease (COVID-19), n.d.).

This assists in the efficient management of healthcare data. The installation of this system aids in increasing patient care quality, lowering operating expenses, eliminating data entry errors, and streamlining the entire internal management process (Kitsios et al., 2020).

However, the HIS has existed all along. There is a lack of research assessing its adoption. Many studies support planning the adoption improvement of the existing situation. This study investigates the factors that are affecting the adoption of HIS systems during the COVID-19 pandemic in Palestine as a case study. This research will be discussed with higher-level decision-makers in the Ministry of Health. This study highlights the strengths and weaknesses and then suggests solutions for weak areas.

1.3 Research Question

This thesis aims to answer the following main question:

- What are the essential factors for adopting, updating or upgrading a hospital information system during Covid-19 in government and non-governmental hospitals in Palestine?

1.4 Hypotheses

This research formulated five hypotheses related to the research problem and questions. The following statements describe these hypothesizes:

Hypothesis 1: The demographic characteristics of HIS users do not affect HIS adoption to usage in facing Covid-19.

Hypothesis 2: The hospital characteristics do not affect HIS adoption to usage in facing Covid-19.

Hypothesis 3: The technology support (compatibility, security & safety) does not affect HIS adoption in facing Covid-19.

Hypothesis 4: The organization and management support do not affect HIS adoption to usage in facing Covid-19.

Hypothesis 5: The environment (government and competitors' pressures) does not affect the HIS adoption to use against Covid-19.

1.5 Research Objective

After defining the problem, this section explains the goals of the thesis. The main research objective is to investigate the factors affecting the adoption, updating, and upgrade of hospital information system during Covid-19 in Government and Non-Governmental Hospitals. In addition, the researcher aims to find a solution to this challenging problem of contributing to developing the health sector in Palestine.

1.6 The Importance of Research

Many types of research and studies worldwide are based on studying the HIS, health technology, and its effect on the health sector. All these results supported the doctor's decision to take the action of discharging the patient, admission, or transfer to a specific treatment hospital.

Our first study focuses on the factors that affect the hospital adoption of HIS systems during Covid-19. To this end, identifying the needed HIS factors to help manage and improve the work quality during Covid-19 patients in Palestine. This research also seeks to understand the factors affecting the adoption of HIS hospitals are essential to enhance patient treatment and dealing with the patient record. The researcher indeed tries to assist in the efficient management of healthcare data. The installation of this system aids in increasing patient care quality, lowering operating expenses, eliminating data entry errors, and streamlining the entire internal management process. (Kitsios et al., 2020).

1.7 Outline Structure of The Thesis

The researcher presents the outline structure o the thesis to help the reader understands its formulation and the process of conducting this thesis. The arrangement of the thesis is as follows:

- **Chapter One:** contains a general introduction, problem statement, research questions, hypotheses, research objectives, and importance of research.

- **Chapter Two:** contains the Literature review introduction, COVID-19 over the world, Coronaviruses Recombination, COVID-19 in Palestine / West Bank, and Health information system as a major subject, HIS internationally and reliable in Palestine, studies related to health information systems and Conid-19 and conceptual framework of the study.

- **Chapter Three** contains the study's methodology, which describes the methods and instruments utilized to perform the investigation. It also covers study design, study locations, sample size and sampling technique, study instrument, data collection, data processing technique, scale correction, and ethical issues.

- **Chapter Four:** the results are presented. This chapter contains respondents' demographic information, characteristics, and tables of percentages relating to questionnaire data and descriptive statistics that support the study's objectives.

- **Chapter Five**: it illustrates the discussion and conclusion. It also presents the contribution, recommendations, the strength of the study, and future work.

- **Chapter Six:** Bibliography

- **Chapter Seven:** Appendix.

Chapter Two: Literature Review and Research Model

2.1 Introduction

This research constitutes a relatively new area which has emerged from the importance of developing the health care system in Palestine. The Coronaviruses viruses are circulating among animals. It is described as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). It is a newly discovered ribonucleic acid coronavirus isolated and identified from patients with unexplained pneumonia in Wuhan, China, on 31 December 2019 (Sun et al., 2020). COVID-19 is a highly transmissible viral illness caused by another zoonotic new coronavirus known as severe acute respiratory syndrome coronavirus2 (SARS-CoV-2) (Khan & Khan, 2021). This new virus and disease were unknown before the outbreak began in Wuhan. COVID-19 is now announced as a pandemic affecting many countries globally. World Health Organization (WHO) declared it as a global pandemic on March 11, 2020 (Q&A on Coronaviruses (COVID-19), n.d.).

Since the number one case in Wuhan, countries worldwide have confirmed cases on 26 March 2021. The whole world's status was around 130422190 confirmed cases of COVID-19. Moreover, there were 2842135 deaths reported by WHO, as shown in Figure 1. While in other big countries, such as the USA, the confirmed cases were 30304462 and 550539 deaths (WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data, n.d.). Since the context of this thesis is Palestine, there were 270878 confirmed cases and 2881 deaths. The researcher compares Palestine to Italy, Iraq, Pakistan, Jordan, Lebanon, Saudi Arabia, Malaysia, occupied Palestinian territory, Egypt, Qatar, China, and the Syrian Arab Republic for clarity purposes, as shown in Figure 2.

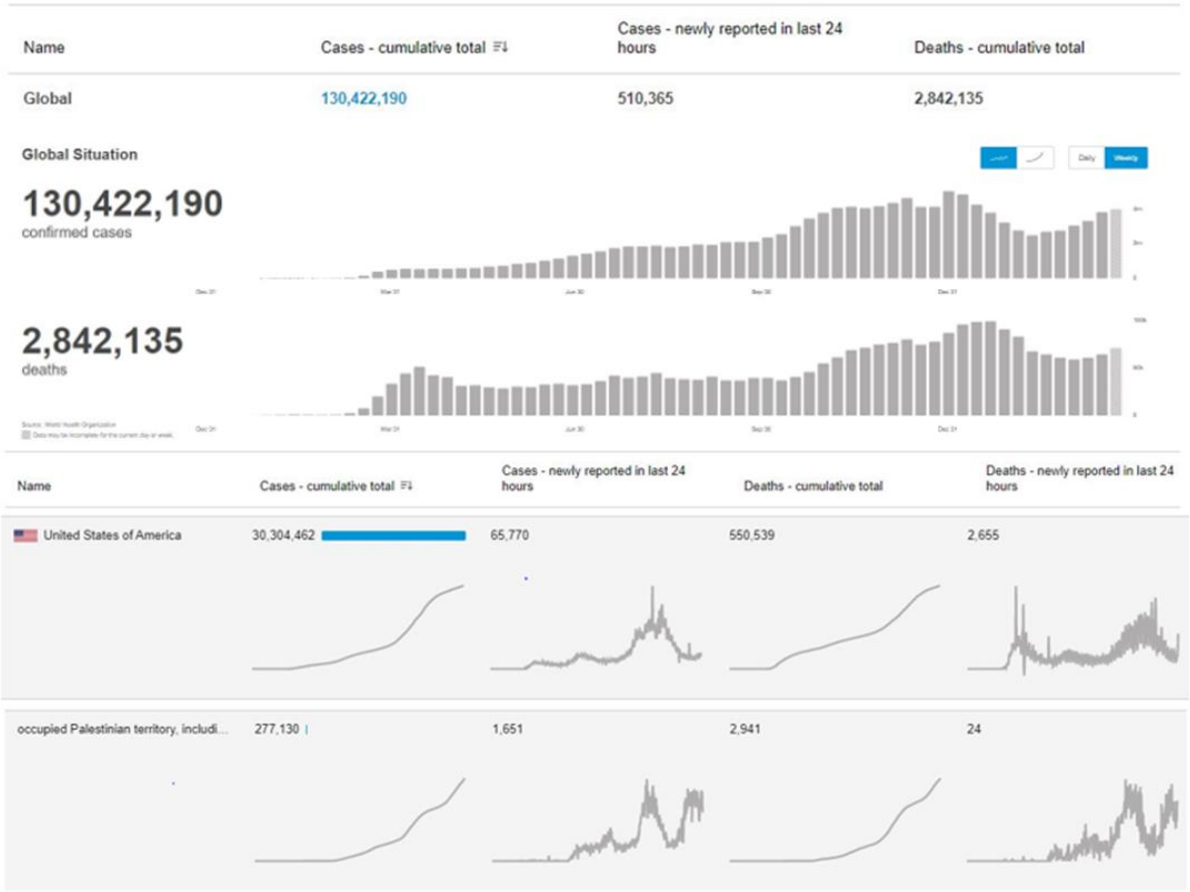

Figure 1: Whole world status (Global), USA, occupied Palestinian territory (WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data, n.d.)

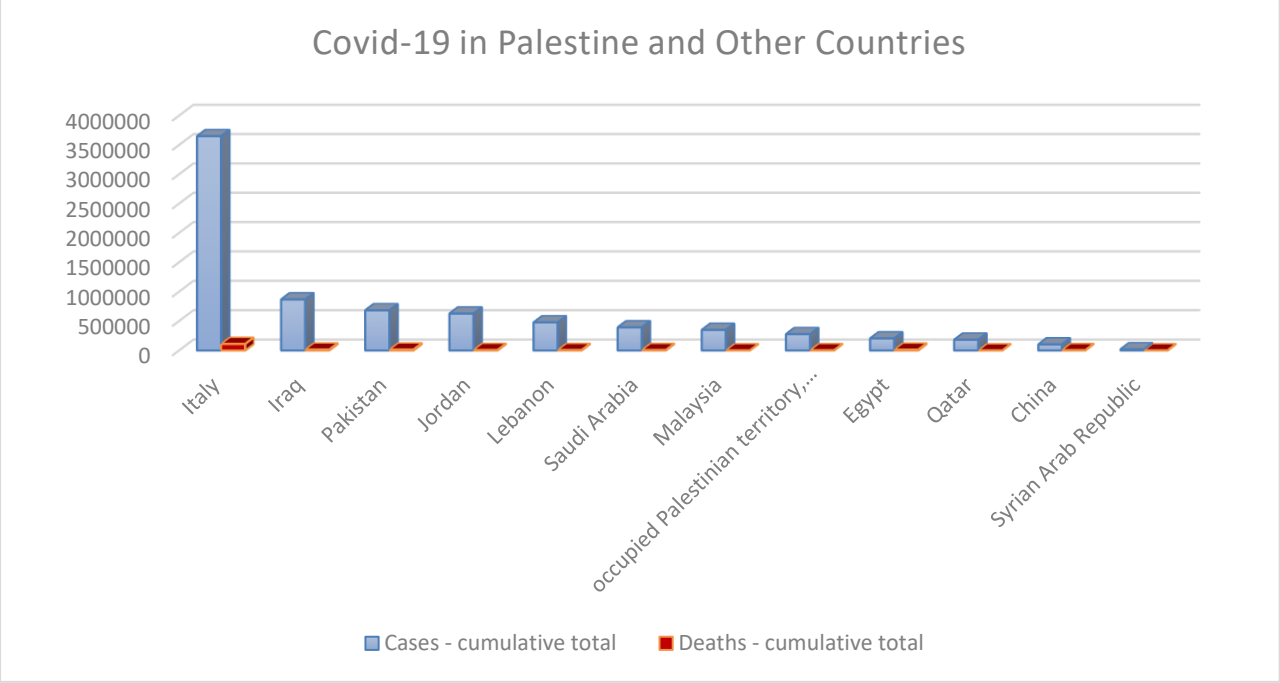

Figure 2: Covid-19 cases compared with Palestine and other countries (State of Palestine, 2020)

The growth of HIS is starting to take place in neighboring and developing countries. COVID-19 is considered a vast worldwide issue. It is crucial to offer strategic development plans through correct and durable pillars.

The health information system provides a database for people's details, making finding a particular person with his details easier. Each person registered to the system with his full details such as national ID, the full name, mother's name, gender, birth date, birthplace, address, mobile and telephone number and so forth to look up a person by any of the aforementioned entered details. This yields each patient has a medical record that reflects every medical thing done on the patient electronic file. He is either an outpatient, inpatient, or emergency patient.

All orders ordered to the patient by the doctor, either laboratory, radiology, or drug orders, are done on the system and documented by date and time. The results are also on the system, so there are no missing results. Different statistics on various populations, such that you can create additional reports that reflect how many admissions (patients visited the hospital) in a certain period. Depending on their gender, age, diagnosis, and address, you can find them in different criteria. This always facilitates the work of the medical researcher.

All mentioned reduces the burden on medical staff since they can easily reach the medical data they need. Also, the system reduces the load on patients; therefore, no more paper is shown in their hands, missing files is less, and everything is documented and saved.

This thesis chapter considers factors to consider while implementing a hospital information system during Covid-19 in Palestine. This chapter also includes health information system reviews in hospitals with Covid-19 worldwide.

2.2 Covid-19 Over The World

On January 1, the infectious disease reporting system was updated from groupings based on disease characteristics to groups based on contagious disease severity, isolation requirements, spreading power, and reporting timeline as part of a partial revision to the Act on Control and Prevention Infectious Diseases. The challenging times of the 2015 MERS outbreak were a massive relief for Korea's COVID-19 response planning (Kang et al., 2020).

In comparison to other healthcare providers, hospitals, as the immediate environment of the public healthcare industry, have more complex systems and workflows (Hossein Ahmadi et al., 2017). To handle the Covid-19 crisis patients, hospitals need to have a system capable of this. Patient information is saved, and the process is crucial. As a branch of medical informatics, HIS uses electronic data processing to provide the best possible patient care and administration support (H Ahmadi et al., 2014). This idea was clear to other researchers who suggested hospitals that have not yet adopted HIS are wasting is a novel concept (Shahzad et al., 2021).

The environments in which individuals live, work, learn, and play can impact a variety of health risks and consequences. The prevalence of numerous dangers and outcomes differs between metropolitan and non-metropolitan locations. Long-standing systemic health and socioeconomic disparities have put some rural individuals at an increased risk of contracting or developing severe COVID-19 illness. Since December 2020, the COVID-19 aggregate death rate through non-metropolitan areas has overtaken that in metropolitan areas (Location, Location, Location | CDC, n.d.).

One in every five people in the United States lives in a rural community. Depending on where they are located, rural places may experience a variety of health concerns. According to the CDC's Social Vulnerability Index (SVI), many people are considered highly vulnerable due to housing, socioeconomic level, transportation, race, and ethnicity. Furthermore, rural towns frequently have a higher proportion of individuals who live with a chronic condition or

disability, do not have health insurance, have a finite access to care institutions with intensive care strength, and are over the age of 65. Because of these circumstances, residents of rural regions are at a higher risk of COVID-19-related sickness and mortality (Location, Location, Location | CDC, n.d.).

2.3 HIS Worldwide

Implementing HIS is incredibly challenging in developing countries because of cultural and environmental differences, such as in Pakistan (Shahzad et al., 2021). The author mentioned health systems are the best place to put principles and factors depending on their frameworks. With adequate preparation, training, and coordination, healthcare systems can be in the best position to fight this new pandemic (Sorbello et al., 2020).

Throughout time, investigating the elements influencing the approval of HIS for hospitals is a continuous process. It is found that the technology environment gives a reason, relative advantage, security concern, compatibility, mimetic pressure-rivals, hospital size, vendor support, Employees' IT expertise, and perceived professional competence of IS workers. These are a few factors for HIS adoption (Hossein Ahmadi et al., 2017).

Our health care system recently moved to a single enterprise with extensive electronic medical records throughout our hospitals, realizing that creative technical innovations were required to respond to the crisis. Given the rapid evolution of COVID-19 epidemiological and clinical knowledge, it was relevant that a clinically informed technique to informatics was required to assist us in adapting to rapidly changing front-line needs (Salway et al., 2020).

In another study, the researcher listed actions for hospitals facing Covid-19 and asked to create a new IT response structure or assess the current one. Continued that all changes to the patient electronic health record (EHR) should be reviewed and disseminated centrally as soon as possible. IT staff must be able to do this 24 hours a day, seven days a week. The results

summarized expedited change management procedures to rapidly upgrade electronic health records (EHR) with updated COVID-19 laboratory and field workflows(Kang et al., 2020).

In the same field, another scholar says that perspectives include the implementation plan of IT facilities, the renovation of feature modules in the healthcare system (HIS), equipment management, and medical personnel preparation in dealing with the unexpected outbreak of COVID-19. Clinical practice has run smoothly and efficiently thanks to the implementation plan and HIS modules. In the 48 hours leading up to patient admission, the network was deployed, and the HIS was updated (He et al., 2021).

However, a related paper talked about South Korea implemented rigorous research as a preventative measure against coronavirus disease (COVID-19). In addition, HIS improved to aid in the workflow and care of patients in the live and recovery service centers (LTSCs). The medical staff was given access to a dashboard displaying all patients' vital signs and symptoms. Patients used a smartphone app to communicate with their doctor or nurse, complete questionnaires, and input self-measured vital signs. The findings were then submitted to the hospital's computer system (Bae et al., 2020). Briefly, studies have demonstrated that each country faced Covid-19 and prepared hospitals for it (Coronavirus Disease (COVID-19), n.d.). This did need to have a system capable of aiding in controlling this, as the author introduced (H Ahmadi et al., 2014). Implementing HIS is incredibly challenging in developing countries (Shahzad et al., 2021).

Nevertheless, the purpose of HIS is to use electronic data processing to provide the best possible patient care and administration support (H Ahmadi et al., 2014). Investigating the influencing elements to reach the approval of HIS for hospitals is a continuous process. It is found that the technology environment gives reasons (Hossein Ahmadi et al., 2017). The researcher talked about NYC Health +, a health care system recently moved to a unified enterprise with significant electronic medical records throughout our hospitals (Salway et al., 2020). Other authors added action to upgrade electronic health records (EHR) with updated

COVID-19 laboratory and field workflows (Grange et al., 2020). The use of HIS Modules for flawlessly working (He et al., 2021). If required, HIS enhancement or update must be done (Bae et al., 2020).

2.4 Covid-19 and HIS In Palestine / West Bank

Evidence from Palestinian life demonstrates the need to maintain fairness and equality among Palestinians and their right to self-determination. Due to the Israeli Separation Wall and road restrictions, Palestinian patients in West Bank and East Jerusalem have limited access to healthcare facilities, impacting their quality of life and mental health. As a result, their problems with Covid-19 increased due to the limited access to health care institutions (Marie, 2021). The MOH solution depends on HIS systems between hospitals and is used in governmental hospitals, linking all of them to one central database server. This encouraged and got the doctor to monitor the patient medical record on his computer screen, and this gave relief to the patient (Schoenbaum et al., 2005). In addition, this provided an important question "why are not all hospitals on the same database, and what factors are preventing them from joining under the same umbrella?".

Palestine has responded quickly and effectively to the outbreak of COVID-19, despite the containment and suppression. Palestine immediately declared a state of emergency when the first cases in the State of Palestine were diagnosed on 5 March 2020 and launched robust national containment measures. So far, Palestine has one of the lowest rates of virus spread and almost no community transmission (State of Palestine, 2020). After that, policymakers announced the "Palestine National COVID-19 Management Protocol " (Sataloff et al., n.d.).

Hospitals are for patient remediation and treatment. They should be admitted, but in 2020 if the patient is a Covid-19 case, the patient was sent to a particular hospital. After MOH plans and strategies to contain the illness and avoid contamination, separation is done. Admission for corona cases did increase, and to handle this huge and increasing patient number and to increase the preparation, it is needed and a must to use a health information system (HIS). Table 1 illustrates the research sample is 30 hospitals, 29 visited (97%). Hospitals are separated into 18 Public hospitals (60%), 6 Private hospitals (20%), and 5 NGO hospitals (17%). One hospital

was not visited (3%). In Addition, for the 29 hospitals ‘current HIS’, the researcher found that 15 (52%) hospitals use ‘MOH Purchase’ HIS, and 6 (21%) hospitals use ‘Purchase’ HIS. Finally, 8(28%) hospitals use ‘Manual’ HIS. By adding doctors and nurses numbers, the researcher wanted to indicate work during Covid-19, knowing that numbers can increase or decrease.

The existing hospitals per governance in Palestine are described in Table 1. These hospitals were classified based on hospital type, hospital Implement, HIS name, and the number of doctors and nurses.

Table 1: Palestinian Hospitals

Governance	Hospital	Hospital Type	Hospital established	HIS Name	Year of HIS Implementation	Doctor	Nurse
Jenin							
	JENIN Government Hospital	Public	1961	Avicenna	2014	126	250
	ALRAZI Hospital	NGO	1989	No Elec HIS	2011 (finance)	80	65
	SHIFA Hospital	Private	11948	No Elec HIS	2017 (finance)	25	30
	IBN SINA SPECIALIZED Hospital	Private	2021	APEX	2021	29	100
Nablus							
	Rafidia Hospital	Public	1976	Avicenna	2011	200	270
	Al-Watani Hospital	Public	1888	Avicenna	2018	50	120
	ST.LUKE'S Hospital (Alainjil)	NGO	1900	No Elec HIS	Manual	25	70
	Specialized Arab Hospital	Private	1997	APEX	2012	50	180
	Nablus Specialty Hospital	Private	2000	No Elec HIS	Manual	80	20
	Women's Union Hospital	NGO	1921	Hospitals	2007	20	80
	An-Najah National University Hospital (An-Najah National University : An- Najah Hospital, n.d.)	Private	2013	ATS	2016	200	380
	Al-Shuhada Military Medical Complex	Public	2015	Avicenna	2020	9	36
	Red Crescent Hospital-Nablus	Public	2020	Avicenna	2021	14	52
Qalqilia							

	Darwish Nazzal Hospital	Public	2009	Avicenna	2011	43	85
	QALQILYA HOSPITAL – UNRWA	UNRWA					
	Azzoun Hospital	Public	2020	No HIS	Manual	5	20
Tubas							
	Tubas Goverment Hospital	Public	2013	Avicenna	2017	40	110
	Kashda Hospital	Public	2020	No HIS	Manual	4	25
Tulkarem							
	Tulkarm Government Hospital	Public	2004	Avicenna	2017	50	190
	Al-Zakat Hospital	NGO	2002	No Elec HIS	Manual	25	80
	Red Crescent Hospital-Tulkarm	Public	2020	No HIS	Manual	5	35
Ramallah							
	PMC (Palestine Medical Complex)	Public	1963	Avicenna	2013	351	381
	Palestinian Venezuelan Ophthalmic Hospital "Hugo Chavez"	Public	2019	Avicenna	2020	16	40
	H-Clinic Hospital	Private	2019	Apex	2019	50	100
Salfeet							
	Salfeet Government Hospital	Public	2006	Avicenna	2014	45	90
Jericho							
	Jericho Goverment Hospital	Public	1998	Avicenna	2014	51	84
Hebron							
	Gov. Hebron Hospital	Public	1957	Avicenna	2011	186	324

	Yatta Hospital	Public	2016	Avicenna	2018	38	65
	Al Ahli Hospital	NGO	1988	Care	2004	150	400
Beit Jala							
	Beit Jala (Al Housain) Hospital	Public	1955	Avicenna	2014	94	230

2.5 Health Information System

2.5.1 HIS Reliable In Palestine

There are growing appeals for understanding the HIS situation in Palestine. The HIS information system is used in Palestine. Table 1 shows that in hospitals with ‘current HIS’, 15 (52%) hospitals use ‘MOH Purchase’ HIS, and 6 (21%) hospitals use ‘Purchase’ HIS, giving a sum of 21 hospitals use HIS, which is (72%). The health information systems implemented in Palestine are as follows:

2.5.1.1 Avicenna

The HIS information system assisted the MOH and its hospitals improve service delivery and resulting outcomes for persons receiving medical services on the west bank (*HEALTH INFORMATION SYSTEM (HIS) ASSESSMENT REPORT*, 2015). The software promotes the integration and coordination of health care across the health care facilities and drives decisions by MOH administrators and health care service providers. Program is a multilingual solution that adheres to internationally recognized criteria (like HL7, ICO10). From 2008 to 2018, PMOH collaborated with USAID-funded Pa Health Sector Development and Reform Project "Flagship" to install (Avicenna HIS) digitized Health Information System in selected (WB) hospitals. Avicenna HIS is an enlarged electronic health record (EHR) program that includes capabilities for patient registration, medical charts, financial information, scheduling, laboratory results, prescription information, ordering and tracking medications.

DataSel's company has proprietary software, Avicenna HIS (*Hospital Information Management System (HIMS)*, n.d.). Now MOH is responsible for system implementation and training for new employees. In addition, the MOH team followed all the points and requests. If information is needed, they are sent to the program firm, which replies by sending an update to the system. Program language Java is a network program. In Palestine, a database server runs the HP-Unix operating system and holds the ORACLE Database management system where the data of HIS system is stored. Oracle installed ORACLE RDBMS 11gR2.DB is RDBMS.

It seeks to cover Palestine (WB) governmental hospitals to be members of this group. Although the patient's name can be seen on any pc on this network, each patient has a unique patient number. It is worth mentioning that two patients can not have the same patient number. The system maintains a database of individuals' personal information, allowing users to locate a specific person using his information.

Medical data entered by doctors and nurses (visit notes, consultation notes, nurses' notes, Fluid information, IV Fluid, forms and reports, and others) is recorded by date. Usually, there are three components to be inserted: day, month, and year and time at its hour, minute, and second. This gave specific population information so that they may generate multiple reports and pivots representing how many admissions (patients went to a hospital) occurred over a particular period. This opens any demographic filter to yield the needed information.

Data protection and backup are available. There is no risk of losing any data entered into the system. If there is any doubt about anything documented on software, the system produces a log file, and the IT team tracks everything done by the user. As a result, if that person deletes a note he authored and then writes another, this is noted in the log file. Other hospital departments linked to the system include general stock, accounting, biomedical engineering, kitchen, maintenance, laundry, and morgue. This implies that hospital non-medical activities may also be done conveniently and efficiently utilizing Avicenna.

The system makes it easier for administrators to monitor the work of hospital staff to know their efficacy and efficiency in their job. In addition to making the employees aware of almost everything they do for the patient, improving healthcare quality.

2.5.1.2 Apex

Apex program is known as (Healthcare – Dimensions Information Technology, n.d.), from "Dimensions" firm. Apex is a complete and integrated portfolio of health information systems meant to manage and regulate medical, administrative, financial, and decision-making processes. Apex is simple to interface with other systems and medical equipment. Apex is created with cutting-edge technologies and architecture. Furthermore, Apex is not just a system but a platform. It has new modules and other solutions introduced to a landscape to increase its functionality. This is based on vast expertise and understanding of health care answers and settings.

The program is a Web application. It is programmed using the net language and SQL database. Private hospitals such as IBN SINA SPECIALIZED Hospital, Specialized Arab Hospital, and H-clinic Hospital use the Apex program. However, each of them works independently of another hospital. They do not work on a specific single network. H-clinic hospital started to depend on Apex in 6/2019. The computer department does manage and fixes needed for computers. All questions are sent to the program company "Dimensions" for the program to update and answer requests. This program follows all hospital departments such as medical wards, management, administrative, and others. For about 400 nurses and 150 doctors, the system did give user names and passwords and needed policies for work on the system page.

2.5.1.3 ATS

ATS Healthcare (ATS Healthcare, n.d.), offers full-service hospital billing services to medical practices of all sizes. Daily claim delivery, full charge entrance and payment posting, follow-up, primary, secondary, and tertiary. Patient billing and call responding, integrated online timetabling, accurate economic reporting, and health insurance eligibility confirmation are part of the Billing Service.

ATS Healthcare offers a tailored transcription method to match the demands of each practice. ATS Healthcare employs medically trained transcriptionists, proofreaders, and editors who work tirelessly to ensure complete correctness. ATS Healthcare also offers an entirely free EMR integration. Notable features include a Default twelve-hour turnaround time, a Customized dictation template to assist the process, a Customized dictation template to ease the process, Records of unrivalled quality, and HIPAA compliance.

An-Najah National University Hospital is one of the leading hospitals in Palestine. It was established in 2013 in cooperation with the Faculty of Medicine and Health Sciences at An-Najah National University. The Hospital is considered one of Palestine's leading institutions in health care. Users only work on the hospital program; the program was bought in 2016 from its company "ATS" located in Jordan, Using Oracle forms 6i and Java. The computer department manages the update and fixes needed in the hospital. This program follows all hospital departments such as medical wards, management, administrative, and others. For about 380nurse and 200 doctors, the system did give user names and passwords and needed policies for work.

2.5.1.4 Shamel Care

Al Shamel offers the management of hospitals (*Comprehensive Program for the Management of Health Centers and M&#382 - Israa Programming and Computer Company*, n.d.), and health centers an integrated solution for monitoring and controlling patient movements in hospital centers and units. It also provides a financial record and medical register. The system generates financial and medical reports. The system assists the medical and financial sectors with management activities.

This program includes an electronic medical file for the patient, managing reservations for patient reviews, controlling purchases and dispensing medicines at the level of the pill or part of the ampoule, requesting and processing laboratory tests, blood bank, electronic radiation, pricing services, and drugs. These are initiated according to the agreements signed with insurance companies, coverage agencies, companies, and government institutions. Finally, it also covers various comprehensive and detailed medical reports. This system has been deployed at the al-Ittihad hospital, Arab heart treatment, surgery center, and future hospitals in strong and efficient methods and through integration and communication with the comprehensive finance system.

2.5.1.5 Care System “CCS”

CARE is currently being used successfully in hospitals throughout the Middle East. CCS's (*HealthCare Solutions | Computer and Communications Systems (CCS)*, n.d.), the experience of best medical practices enables CARE to provide exceptional value and perhaps the most excellent technological features. It is a desktop application. The source code was bought in 1990 from its company “CCS, “in Jordan. The program started to follow all hospitals as HIS in 2004. It is programmed using Oracle forms 6i and using Oracle database. The computer department does manage the update and fix needed in the hospital. This program follows all hospitals department: medical wards, management, administrative, and others.

Al Ahli Hospital uses the CARE program for about 400 nurses and 150 Doctors. The system gave users names and passwords and needed a policy for each. Program is a multilingual solution that adheres to internationally recognized criteria (like HL7, ICO10).

2.6 Technology Organization Environment (TOE) Framework

Several tools can be used to assess the acceptance and adoption of any system. One of the most famous and used theories is the Technology Organization Environment (TOE) framework. There are growing appeals for understanding this theory. It is a firm-level theory that describes how three major aspects of a company's setting influence the acceptance and adoption of a system. The technology context, organizational context, and environmental context are the three aspects. All three are thought to impact adoption (Dwivedi et al., 2012) (Chong & Olesen, 2017).

In 1990, Tleisher and Tornatzky investigated the acceptance of general technology innovation within organizations. They underlined the technological aspects that can influence the adoption process. This demonstrates how the characteristics of companies can help or hinder the acceptance of technological innovation. These characteristics include the organization's size, top management support, structure, and the availability of efficient human resources. However, a few outside environmental elements influence the adoption process. Among such external forces are government policy, higher-level laws and regulations, competition pressure, and resources provided by other sources.

TOE's technological component includes external and internal technologies, such as equipment and software applications that the firm typically implements. The organizational context consists of the firm's size, human and physical resources, management, and employee interdependence. The environmental context involves the firm's structure, competitors, and regulatory authorities. Previous studies have frequently used the TOE approach to explain the acceptance of innovation by diverse financial, manufacturing, education, health, and other organizations.

Technological factors: The technological variables examined in the technological adoption research are compatibility, complexity, technological readiness, IT infrastructure, perceived direct and indirect benefits, and perceived risks. The coding scheme is depicted in Figure 3.

Organizational factors: The organizational variables examined in the adoption research are attitudes towards innovation, financial resources, organizational size, knowledge, information sharing culture, learning culture, and top management support. The coding scheme is depicted in Figure 3.

Environmental factors: The environmental variables examined in the technological adoption research are competitive pressure, government pressure, competitors pressure, ecological uncertainty, regulatory support, and trading partner readiness. The coding scheme is depicted in Figure 3.

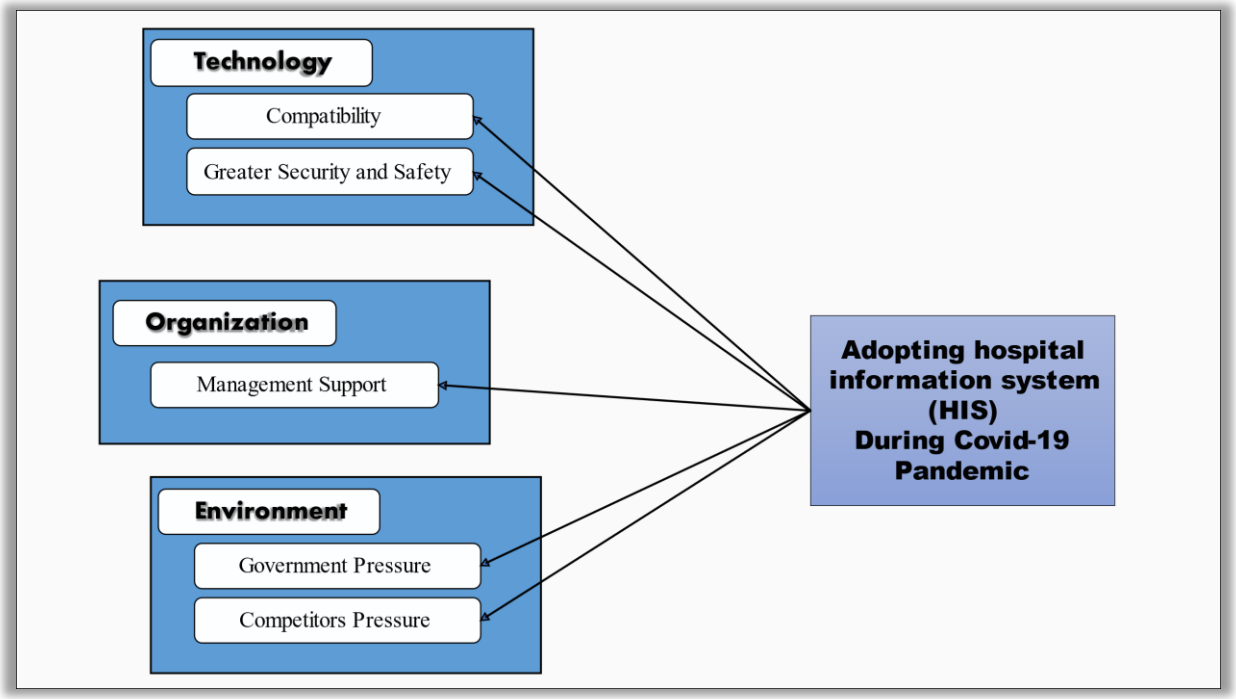

Figure 3: TOE(Shahzad et al., 2021)

In this thesis, the researcher adopted the TOE framework to assess the HIS adopting during Covid-19. The following section explains the study's conceptual framework.

2.7 Conceptual Framework of The Study

Recent theoretical developments have proved its effectiveness in understanding the study matter. The conceptual framework of our study has been described below. It contains the dependent and independent variables included in this thesis. Our study has the dependent and independent variables, which describe and visualized in figure 4:

A- Dependent Variables

The study dependent variable is adopting a hospital information system during the Covid-19 pandemic. The following questions were used to assess the adoption during Covid-19.

- Q2: During the Covid-19 period, using the health information system (HIS) supported identifying the Covid-19 cases.
- Q3: My overall satisfaction with using HIS has increased during the Covid-19 period.
- Q10: Hospital medical team use HIS intensively during Covid-19.
- Q11: Hospital directors and administrations utilize HIS effectively during Covid-19
- Q15: Adopting HIS supports vaccine program during covid-19.

B- In-dependent Variables

This thesis has five main domains as independent variables. Each domain and questions related to that domain will be highlighted below:

- **The Demographic Characteristics of HIS Users**
  - Age
  - Gender
  - Qualification
  - Living place
  - Level of experience
  - Years of experience

- **The Hospital Characteristics**
    - Size of the hospital
    - Employees/team size

- **The Technology Support (Compatibility, Security & Safety)**
    - Q6: Systemized patients files underwent accurate, Privacy, and reliable information
    - Q8: Health care and informatics providers must keep the covid-19 patients files safe and private
    - Q9: HIS uses special alert for confirmed Covid-19 cases files

- **The Organization and Management Support**
    - Q1: HIS manager provides help to the senior manager (Current situation).
    - Q7: Hospital's administrators support technology systems in the hospitals.
    - Q14: Last year, the health institutions used health information system to provide a comparison between average number of weekly visits pre-COVID-19 and during Covid-19.

- **The Environment (Government and Competitors Pressures)**
    - Q4: Government supports the technology systems in the hospitals.
    - Q5: HIS at MOH provide more facilitated referral between hospitals that have HIS.
    - Q12: Other hospitals aspire to get in computerized systems in their hospitals.
    - Q13: Prefer to grant computerized health system in all health sectors (Private, NGO, UNRWA, and MOH) in our Palestinian country.

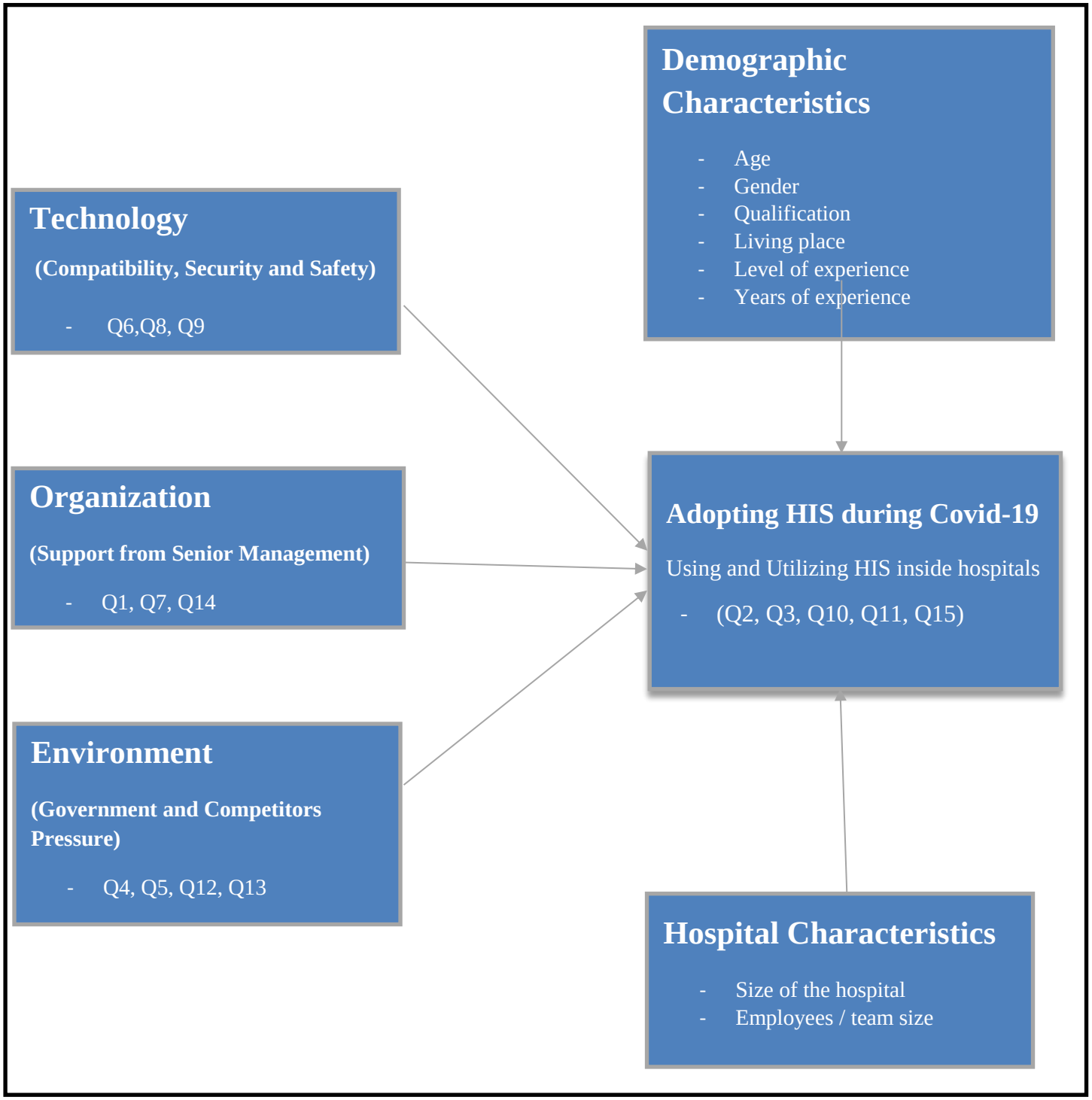

Figure 4: dependent and independent variables

2.8 Summary

This chapter included the situation of COVID-19 worldwide and in Palestine, health information systems as a significant subject, and HIS internationally and in Palestine. It also presented studies related to Covid-19 and health information systems, the TOE framework for assessing accessibility and adoption of any system. After careful reading, the researcher ended by adopting a conceptual framework for this thesis. The following chapter explains the research methodology of this thesis**.**

Chapter Three:
Materials and Methods

3.1 Introduction

This chapter covers the study design, study environment, demographic and sample size, instrument, data collection tools, data analysis method, ethical issues, scale correction, and study constraints.

3.2 Study Setting

The study included approximately 30governmental and non-governmental hospitals in Palestine. The researcher chooses the government hospitals in Jenin, Nablus, Qalqilia, Tubas, Tulkarem, Ramallah, Salfeet, Jericho, Hebron, Beit Jala. All the hospitals mentioned are listed in Table 1. Upon the Ministry of Health (MOH) Annual Report 2019, Palestine has 85 and 28 MOH hospitals. With a population \ hospital ratio of 58,549 (Ministry of Health, 2019). MOH hospitals are distributed in 15 hospitals in West Bank (WB), over eleven Governments, and thirteen hospitals in Gaza with Over five Governments, as illustrated in Figure 5.

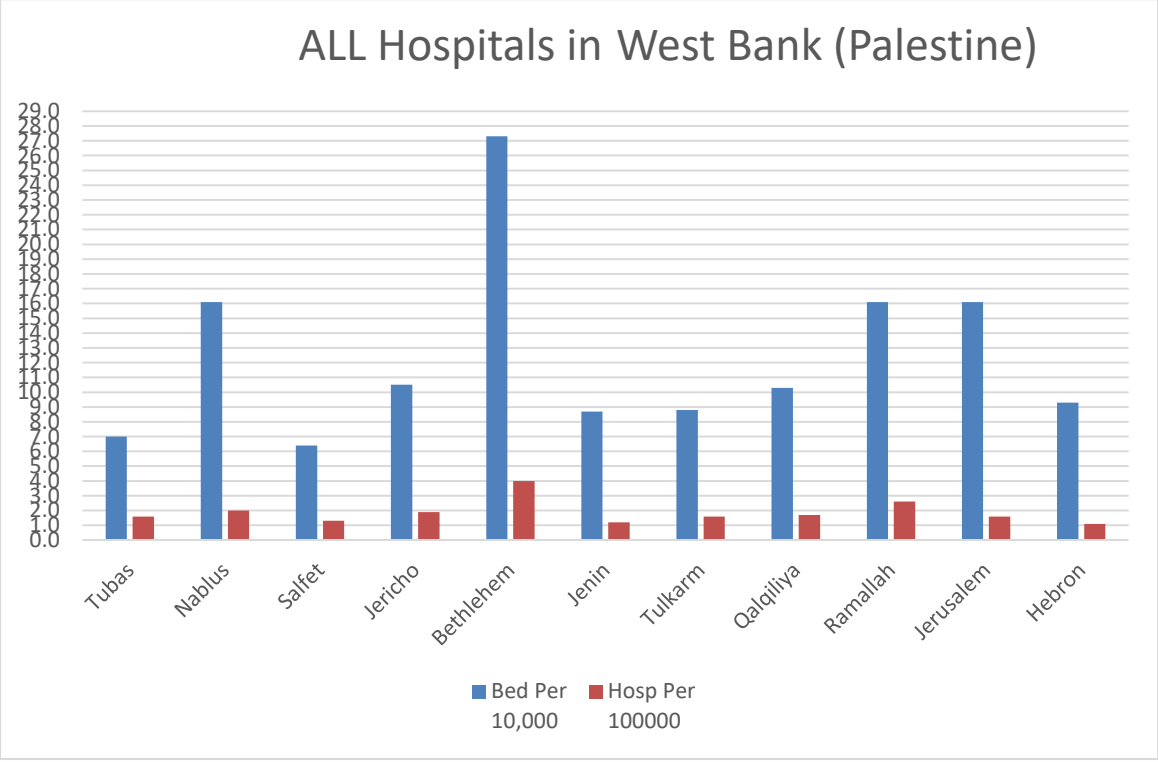

Figure 5: All Hospitals Distributions within cites in West Bank-Palestine (Ministry of Health, 2019)

Figure 5 is a summary of bed rats per 10,000 patients distributed across WB. This distribution to cover as much patients can be seen as limited by the hospital beds, shown in Figure 6.

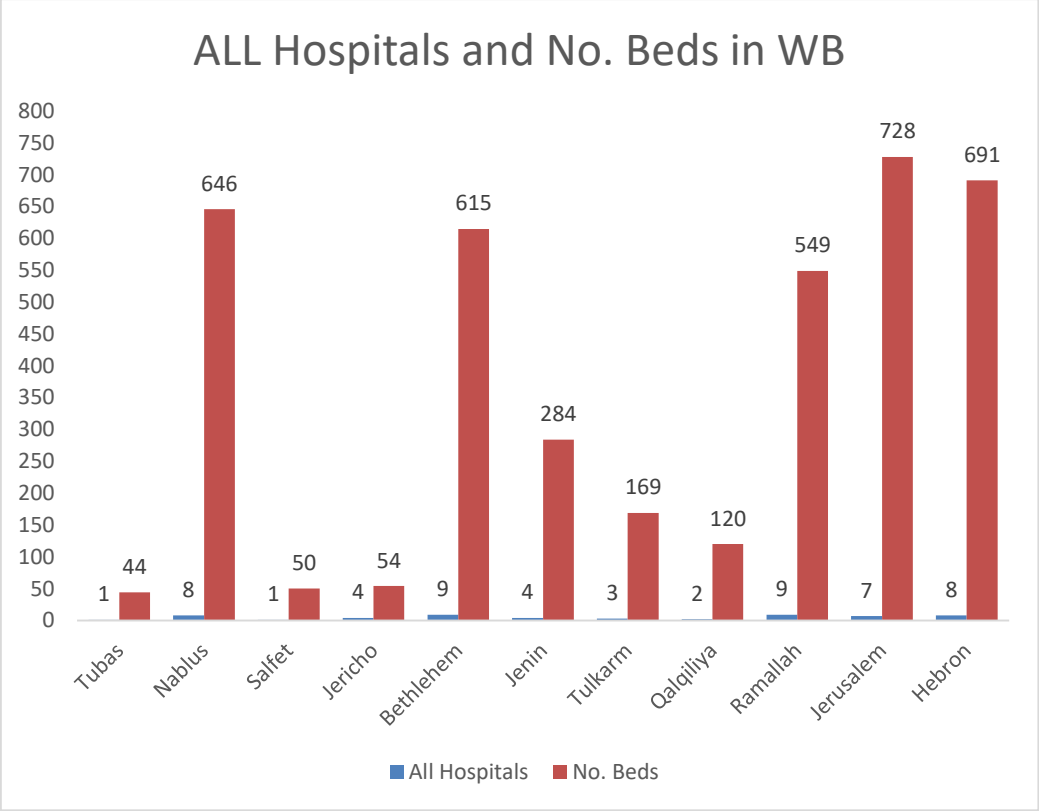

Figure 6: ALL Hospitals and No. Beds in WB

A focal point in this is demonstrated by the patient beds giving the medical treatment throw Figure 7. It is illustrated in Annex (114) (*List of Annexe*, n.d.), Beds Per 10,000 in West Bank 13.2, and Gaza 12.5. Total Palestine 12.9 (*List of Annexe*, n.d.).

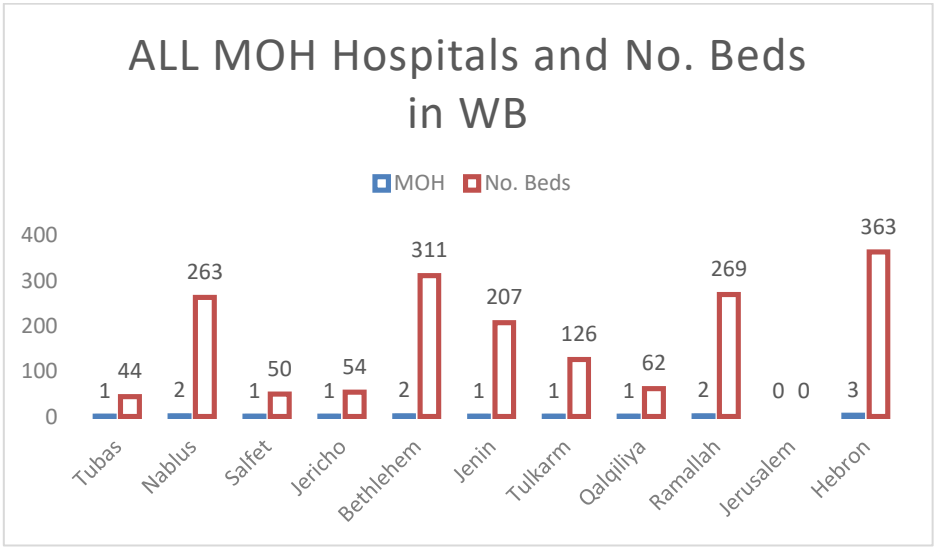

Figure 7: All MOH Hospitals Distributions within cites in Westbank-Palestine (*List of Annexe*, n.d.)

There are major theoretical and conceptual frameworks for the implementation of the HIS. All Government hospitals are using HIS and depending on the Avicenna program. While other non-Government hospitals between Private and NGO hospitals in Palestine do not use it, each one of these hospitals uses its program. In the Corona-19 era, some MOH hospitals were initiated for working issues and covering the patient's load. The last newly launched hospital in Nablus was Red Crescent Hospital.

3.3 Study Design

The researcher employed a cross-sectional approach in this thesis, simultaneously gathering data from many locations. The researcher chose it since cross-sectional studies catch a precise point in time and need less time than other study forms.

This study introduced mixed methods using two types, quantitative questionnaires and qualitative (semi-structured interviews). Abuhamda et al. stated, "Quantitative and qualitative methods are the engine behind evidence-based outcomes" (Abuhamda et al., 2021). The thesis sample includes Direct Managers Staff of the Hospitals in Palestine, consisting of 30 hospitals, both Government and non-Government. The target population were mainly hospital Board Managers (4-8), managers, doctors, nurses, management, med engineers, pharmacists, laboratory, computer department from each hospital, and hospital computer experts (1-2).

As stated above, the researcher tries to collect quantitative and qualitative data through questionnaires and semi-structured interviews. A quantitative survey for the research study was prepared and analyzed to explain the HIS implementation factors, which had a significant effect. In this study, manager boards and HIS or computer experts filled out this questionnaire. Moreover, semi-structured interviews were conducted; each person was respectfully directed to a different room. Every interview took ten to fifteen (10-15) minutes. For quality purposes,

the interviews were recorded by a mobile recorder with prior permission from the participants. For each participant, a face-to-face interview was held.

3.4 Study Population and Sample Size

From the whole target population consisted of Palestine hospitals and mainboard members, including doctors, nurse, management, med engineer, pharmacist, laboratory, and computer department, who work in Palestine hospitals. The research source population was hospitals on the West Bank. The researcher conducted this thesis on the sample **population,** of thirty hospitals in ten government hospitals in the West bank. The selection includes mainboard members (4-8), managers from each hospital, and hospital computer experts. Finally, the **study population** are the total number of twenty-nine hospitals were chosen to participate in the thesis. They are non-probability purposive sampling was used as information-rich participants were sought. The participants are part of the decision team members of the hospital.

3.4.1 Sample Size Calculation

To calculate the sample size of our study, the researcher used the sample size for a given population size, ‘N-S’ (Onainor, 2019). After finding the needed ‘N’=7000, Table 2 gives the related ‘S’ = 364.

Table 2: Sample size for a given population size ‘N-S’

N	*S*	*N*	*S*	*N*	*S*
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10 000	370
150	108	750	254	15 000	375
160	113	800	260	20 000	377
170	118	850	265	30 000	379
180	123	900	269	40 000	380
190	127	950	274	50 000	381
200	132	1000	278	75 000	382
210	136	1100	285	1 000000	384

3.5 Study Instruments

Since this thesis adopts mixed methods, designing a quantitative questionnaire for all mainboard members and IT experts. Mainboard members include doctors, nurses, management, med engineer, pharmacist, laboratory, and computer department. The members have the power and are able to decide and give answers to the hospital's major plans. The questionnaire mainly focuses on the essential points that lead to convincing the hospital's current situation .The qualitative interviews and their questions were distributed to ask a member or two in each hospital.

The questions in the questionnaire were developed based on the researcher's literature reviews. It was written in the English language. Corona-19 is a novel subject, so the researchers reviewed all the questions. The questionnaire was then sent to several experts for validation, and modifications were done based on the expert’s feedback. A list of the experts can be found in Appendix I.

The quantitative questionnaire is ready to deploy depending on the mentioned resources and hypothesis. It was reviewed by three experts who did approve. Twenty-nine (29) questions are prepared and distributed in two sections. An electronic questionnaire using the "KoBoToolbox" program is a set of field data collecting tools designed for use in such circumstances. This software is an open and accessible source, and it may be used both online and offline (Office for the Coordination of Humanitarian Affairs (OCHA), 2019) (*Welcome to KoboToolbox*, n.d.). The reason for adopting an online questionnaire is basically because it has become a well-known method for data collection during Covid-19. In addition, the researcher believes that to save the environment and reduce using paper.

In the period of 3-weeks, the researcher requested participants to complete the questionnaire. The researcher sent it by "WhatsApp" application on the mobile or computer they use. After completing the questionnaires and clicking submit, the results are sent from the device or mobile to the Kobo webpage. The data was collected between 18/10/2021 and 03/01/2022.

The research team created the questionnaire and nurse professionals to ensure that it included all of the necessary HIS functionalities. The questionnaire was divided into two main sections. The former was intended to gather demographic information about the respondents and the hospitals where they work. The latter was designed to collect information about adopting a Health Information system (HIS, technology, organization and environment factors that might affect adopting HIS.

Section A

The first section seeks to gather information about the respondent's demographic information. This information includes gender, age, academic qualification, living place, working period at the hospital, and their occupation at the hospital, such as a doctor, nurse, management, med engineer, pharmacist, laboratory, or computer department.

The section also gathered their position at work like director, manager, coordinator, head nurse, computer department, staff, and med. Engineer. Moreover, the questionnaire got their computer knowledge, type of training on health information systems (HIS) and group training such as one-to-one training, user manual reading, none. In addition, the researcher obtained other kinds of data like government and hospital places (Jenin, Nablus, Qalqilia, Tubas, Tulkarm, Ramallah, Salfeet, Jericho, Hebron, Beit Jala). After that, select the hospital as the list in the table(Coronavirus Disease (COVID-19), n.d.).

Furthermore, the researcher received their hospital sector from respondents like public, private, NGO, and UNRWA. The researcher tried to get in-depth data such as hospital bed count selection and hospital team count selection. The respondents answered the questions of the questionnaire without stating their names to ensure that they gave accurate information. They were informed about the goals of this questionnaire and that the obtained data will be used for research only.

Section B

The second section asked the participants about adopting a Health Information system (HIS, technology, organization and environment factors that might affect adopting HIS.

The questionnaire items used five-point answers utilizing the Likert scale, a measure for gauging behaviors and employed in surveys, particularly in statistics. Relying on results and selections, the scale used here is based on these results indicating how much support or opposition the respondent has. The average is then determined to estimate the effect of utilizing and implementing HIS, either computerized or non-computerized health information systems in government and non-government institutions, from the perspective of each hospital's board of directors, HIS users, and hospital computer specialists.

The levels that have been adopted are as follows:

Strongly agree, Agree, Neutral, Disagree, and Strongly disagree, as shown in Table 3.

Table 3: Based on the mean, levels of respondents' responses to questions.

Level	Mark
Strongly agree	1
Agree	2
Neutral	3
Disagree	4
Strongly disagree	5

Table 4, illustrates and describes the relation and questions. Listed by dimensions. All questions listed in numbering in Appendix A.

Table 4: Relation and Questions

➢ **Adopting HIS**					
	Q2: During the Covid-19 period, using the health information system (HIS) supported identifying the Covid-19 cases.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q3: My overall satisfaction with using HIS has increased during the Covid-19 period.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q10: Hospital medical team use HIS intensively during Covid-19				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q11: Hospital directors and administrations utilize HIS effectively during Covid-19				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q15: Adopting HIS supports vaccine program during covid-19.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
➢ **The technology support (compatibility, security & safety)**					
	Q6: Systemized patients files underwent accurate, Privacy, and reliable information				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q8: Health care and informatics providers must keep the covid-19 patients files safe and private				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q9: HIS uses special alert for confirmed Covid-19 cases files				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree

➢ **The organization and management support**					
	Q1: HIS manager provides help to the senior manager (Current situation).				
	○ Daily follow up	○ Monthly Visit			
	Q7: Hospital's administrators support technology systems in the hospitals				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q14: Last year, the health institutions used health information system to provide a comparison between average number of weekly visits pre-COVID-19 and during Covid-19,				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
➢ **The environment (government and competitors' pressures)**					
	Q4: Government supports the technology systems in the hospitals.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q5: HIS at MOH provide more facilitated referral between hospitals that have HIS.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q12: Other hospitals aspire to get in computerized systems in their hospitals.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree
	Q13: Prefer to grant computerized health system in all health sectors (Private, NGO, UNRWA, and MOH) in our Palestinian country.				
	○ Strongly agree	○ Agree	○ Neutral	○ Disagree	○ Strongly disagree

3.6 Reliability of The Questionnaires

To evaluate the questionnaire reliability, the internal consistency test was used. The Cronbach Alpha was 0.82, indicating the questionnaires have a high degree of reliability and are subject to reliance to achieve the study objectives.

3.7 Data Collection

Upon studying the population and size, the researcher visited the MOH site to get the hospital distribution in Palestine- West Bank Governments. The researcher listed hospitals in an excel sheet, separated by each Government. Besides each hospital in excel, write the first date and following dates to contact the focal point in this hospital. The researcher contacts the representative person in charge at each hospital. Then, the researcher explained the goals of the research and the reasons beyond conducting this research at their respective hospital. His leading role is to offer the permit for the researcher to distribute an electronic questionnaire and the qualitative meeting if done.

The researcher highlights the focal point for all individuals who must complete the questionnaire. All participants have the right to decline to participate in the research. Among the ten governments in this study, the researcher started with Red Crescent Hospital-Nablus, since it is a Covid-19 hospital, then Al-Watani Hospital .The researcher visited all hospitals in six governments. The total number of visited hospitals was twenty-two among all Palestinian cities in West Bank. These cities are Nablus, Qalqilia, Jenin, Tulkarem, Tubas, and Salfeet, as listed in Table 1.

Contact representatives were assigned in each hospital to facilitate communications with participants. The research objectives and electronic questionnaire were distributed electronically through mobile applications and emails.

The survey responses were kept in a safe location, and none of the employees' managers had access to read the answers. After the data inserting process, all data were transferred to SPSS for data analysis

3.8 Data Analysis

"IBM Statistical Package for Social Sciences (SPSS)" version 25 was used to examine the data. Every one of the questionnaire variables was subjected to a descriptive analysis, which yielded frequencies, means, percentages, and standard deviations. The Pearson's correlation coefficient was used to see if there was any association between the requirements for health information systems in the Covid-19 period. To see if there was a difference across all hospital sectors, researchers used (ANOVA) Analysis of variance. It was used to assess the impact of having the required HIS in a public, private, or non-profit hospital from the respondents' points of view. To this end, the questionnaire aimed at understanding the differences in socioeconomic status and fifteen multiple-choice questions.

The thematic content analysis was used for qualitative data to analyze the interview transcripts. This analysis method is widely used to analyze qualitative research. It is comprised of six steps. For this, the recordings as a transcript started to crate codes from phrases, sentences, words, and codes into Microsoft Excel to summarize them. Then the researcher selects essential items and launches a discussion on them. For quality purposes, the researcher checked the results themes and gave a proper name. Finally, the report is analyzed (How to Do Thematic Analysis | A Step-by-Step Guide & Examples, n.d.).

3.9 Ethical Considerations

All applicable standards of experimentation ethics and research integrity were followed in this research. The researcher asked to obtain permission must mention that each of the thirty hospitals in the study had an AAUP Approval letter. The researcher asked permission from the

MOH to distribute the questionnaire to targeted sample employees in government hospitals, see Appendix D.

Results from hospitals differ upon each hospital policy, presented in their replies. After sending the AAUP Approval letter for public hospitals, MOH replied with a “Checklist for Research Facilitation”; after the researcher finished filling it, MOH sent the Approval (Appendix E).

3.10 Study Limitations

This kind of study usually has its limitations.

- The COVID-19 situation in Palestine, the state of Emergency, and the forced quarantine limits our movement to gather more data and information from other hospitals between cities.
- The political controls and Israeli checkpoints limit researcher movement between cities.
- Because of the lack of permits, the researcher decided to exclude Gaza Strips hospitals.

3.11 Summary

The study's methodology was discussed in this chapter, which described the qualitative and quantitative methods and instruments utilized to perform the investigation. The chapter also covered several topics: study design, locations, sample size and sampling technique. The researcher elaborated on the study instrument, data collection, procedures, data processing technique, scale correction, and ethical issues, ending with the thesis limitation.

Chapter Four:
Results

4.1 Introduction

The researcher in this chapter presents the results of the thesis and comments on them to offer the reader a clear understanding of the thesis's questions. A total number of 212 managers, doctors, nurses, technicians, engineers, and employees in the field were included in the sample population. In addition, a total number of 29 participants were interviewed in this thesis from all hospitals in Palestine; northern, middle, and southern districts in Palestine. Things to be mentioned is that one participant did not complete the questionnaire and was excluded from the study. In the coming sections, the researcher introduces the quantitative and qualitative results.

4.2 Section One: Quantitative Findings

4.2.1 Response Rate and Demographic Characteristics

From the short review above, the researcher describes the thesis results. The online survey was sent to 212 experts. Around 211 participated in our study with a response rate (of 99.52%).

Results suggest that most study participants were males (76.3%, n=161), as shown in Table **5**. The majority of the participants were from the age group less than 31-40 years (41.7%). Most of the 'Educational Level' was Bachelor 112(53.1%) and Master (30.3%). The majority of the participants were for 'working period in hospital' more than 16 years' of experience 82 (38.9%), indicating that more experience over the years shows in participators. However, the lowest percentage for years 11-15 (19.4 %). Regarding the 'position', 'manager' is the highest position (23.2%), indicating that more head nurses and matrons have a part in the decisions, the lowest percentage for 'Technician '(0.5 %). The 'nurse' participants were the highest (34.6%). Likewise, the lowest percentage was for 'Technician '(0.5 %).

About ‘Computer Knowledge,’ The majority of the participants were ‘advanced beginners’ with 78 (37%) and second 64 (30.3 %) are and ‘experts’ user who can assist others. For this reason, most of them got computer training either group training or one-to-one training.

With regards to “Type of Training” on health information system (HIS), “Group Training” was selected by (117 (55.5%)) participants, ‘One to One Training’ was chosen by (62) participants with a percent (29.4%). ‘User Manual Reading’ was selected by (22) participants with a percent (10.4%), while it was not chosen from the rest. The last selection, ‘None,’ was selected by (36) participants with a percent (17.1%),

The participated hospitals were distributed over ten governments. Around (35.5%) of this study's participants were in NBLUS, as shown in Table 1. Then, in Jenin (13.7%), the third was Tulkarem and Qalqilia hospitals (10.4%).

Table 5: Socio-demographic characteristics of the participants

#	Factor		Freq.	Percent
1	**Gender**	Male	161	76.3%
		Female	50	23.7%
2	**Age**	>=30	29	13.7%
		31-40 Years	88	41.7%
		41-50 Years	62	29.4%
		>50 years	32	15.2%
3	**Educational Level**	Diploma	13	6.2%
		Bachelor	112	53.1%
		Master	64	30.3%
		Doctorate	22	10.4%
4	**Living place**	Same Hospital City	125	59.2%
		Same Hospital Governorate	52	24.6%
		Other Governorate	34	16.1%
5	**Working period in hospital**	1-5 years	46	21.8%
		6-10 years	42	19.9%
		11-15 years	41	19.4%
		>= 16	82	38.9%
6	**Position**	Director	41	19.4%
		Manager	49	23.2%
		Coordinator	15	7.1%
		Head nurse	41	19.4%
		Computer Department.	23	10.9%
		Staff	32	15.2%

		Med engineer	9	4.3%
		Technician	1	0.5%
7	**Working in Hospital**	Doctor	31	14.7%
		Nurse	73	34.6%
		Management	45	21.3%
		Med Engineer	11	5.2%
		pharmacist	10	4.7%
		Laboratory	15	7.1%
		Computer Dep.	25	11.8%
		Technician	1	0.5%
8	**Computer Knowledge**	Beginner with limited computer skills	45	21.3%
		Advanced beginner	78	37%
		expert user who is able to assist other	64	30.3%
		expert with advance training	24	11.4%
9	**Type of Training:** **Group Training**	Yes	117	55.5%
		No	94	44.5%
	Type of Training: **One to One**	Yes	62	29.4%
		No	149	70.6%
	Type of Training:	Yes	22	10.4%
		No	189	89.6%

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	User Manual			
	Type of Training: NO Training	Yes	36	17.1%
		No	175	82.9%
10	**Governorate**	Jenin	29	13.7%
		Nablus	75	35.5%
		Qalqilia	22	10.4%
		Tubas	13	6.2%
		Tulkarm	22	10.4%
		Ramallah	17	8.1%
		Salfeet	8	3.8%
		Jericho	4	1.9%
		Hebron	18	8.5%
		Beit Jala	3	1.4%

4.2.2 Hospital Related Characteristics

As shown in Table 6, for hospital selection, about (10%) of this study's participants were in Al-Watani Hospital. The majority of hospitals were from the public sector, 161 (76.3%) whereas the private sector (13.3%). Most of the participants, 85 (40.3%), were from hospitals with 30-60 beds.

Table 6: Hospital-Related Characteristics

#	Factor			Freq.	Per.%
1	**Hospital**	**JENIN**	JENIN Government Hospital	10	4.74%
			ALRAZI Hospital	4	1.90%
			SHIFA Hospital	3	1.42%
			IBN SINA SPECIALIZED Hospital	12	5.69%
		Nablus	Rafidia Hospital	18	8.53%
			Al-Watani Hospital	22	10.43%
			ST.LUKE'S Hospital (Alainjil)	5	2.37%
			Specialized Arab Hospital	2	0.95%
			Nablus Speciality Hospital	2	0.95%
			Women's Union Hospital	6	2.84%
			An- Najah National University Hospital	6	2.84%
			Al-Shuhada Military Medical Complex	7	3.32%
			Red Crescent Hospital-Nablus	7	3.32%
		QALQILYA	Darwish Nazzal Hospital	20	9.48%
			Azzoun Hospital	2	0.95%
		Tubas	Tubas Government Hospital	11	5.21%
			Kashda Hospital	2	0.95%
		Tulkarm	Tulkarm Goverment Hospital	16	7.58%
			Al-Zakat Hospital	3	1.42%
			Red Crescent Hospital-Tulkarm	3	1.42%
		RamAllah	PMC (Palestine Medical Complex)	9	4.27%
			Palestinian Venezuelan Ophthalmic Hospital	5	2.37%
			Hclinic Hospital	3	1.42%
		Salfeet	Salfeet Government Hospital	8	3.79%
		Jericho	Jericho Goverment Hospital	4	1.90%
		Hebron	Gov. Hebron Hospital	8	3.79%
			Al Ahli Hospital	4	1.90%
			Yatta Hospital	6	2.84%
		Beit Jala	Beit Jala (Al Housain) Hospital	3	1.42%
2	**Sector**		Public	161	76.3%
			Private	28	13.3%
			NGO	22	10.4%
3	**Hosp. Bed**		30-60	85	40.3%
			61-90	42	19.9%
			91-120	14	6.6%
			121-150	18	8.5%
			More than150	52	24.6%
4	**Hosp. Team**		Less than or equal 30	12	5.7%
			31-70	26	12.3%
			71-100	19	9%
			101-150	37	17.5%
			More than150	117	55.5%

The Figure 8 shows the participants' distribution among hospitals. About (10%) of the participants were from Al-Watani Hospital. More details can be found below.

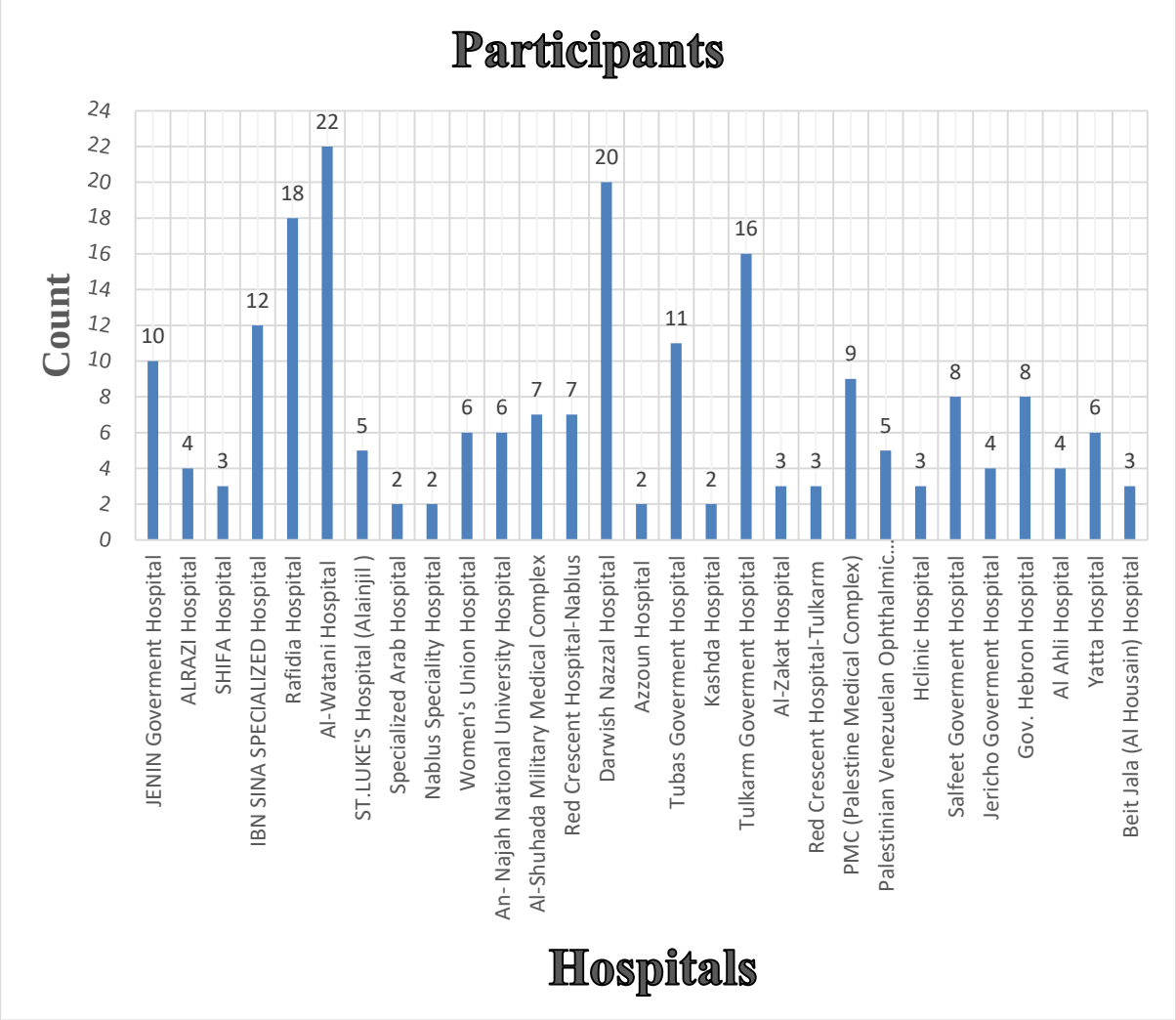

Figure 8: Hospitals Participants

4.3 Section Two: The Results of the Users' Perspective of Adopting the Health Care System during the Covid-19 Outbreak.

4.3.1 Adoption Domain

Table 7 shows the adoption of HIS during the Covid-19 period. Most of the participants highlighted that "using the HIS supported identifying the COVID-19 cases" (strongly agree 60(28%) and agree124 (58.8%) with a mean of 1.886 at (SD 0.740) The "Satisfaction with HIS has increased during the Covid-19 period" most of the participants choices (strongly agree) 49(23.2%) and agree 134(63.5%).Next, the "medical team use HIS intensively during Covid-19" with the biggest percentage in the adopting domain for "strongly agree" selection, most of the entrants selections (strongly agree 38.4% and agree 48.8%). Then, for "Directors utilize HIS effectively during Covid-19," selections were (strongly agree 26.5% and agree 55.5%). Finally, the biggest mean, for "Adopting HIS supports vaccine system in covid-19", with selections (strongly agree 9.0% and agree 60.2%). Table (7): Distribution (%) and mean of questions related to healthcare adoption of HIS during the covid-19 outbreak:

Table 7: Adopting HIS Domain

Adopting HIS							
Statement	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly disagree**	**Mean**	**Std. Dev.**
During the Covid-19 period, using the health information system (HIS) supported identifying the Covid-19 cases.	60	124	20	5	2	1.886	0.740
	28.4%	58.8%	9.5%	2.4%	0.9%		
My overall satisfaction with using HIS has increased during the Covid-19 period.	49	134	23	4	1	1.929	0.676
	23.2%	63.5%	10.9%	1.9%	0.5%		
Hospital medical team use HIS intensively during Covid-19	81	103	20	6	1	1.782	0.768
	38.4%	48.8%	9.5%	2.8%	0.5%		
Hospital directors and administrations utilize HIS effectively during Covid-19	56	117	19	17	2	2.14	0.875
	26.5%	55.5%	9%	8.1%	0.9%		
Adopting HIS supports vaccine program during covid-19	19	127	48	15	2	2.308	0.771
	9%	60.2%	22.7%	7.1%	0.9%		

4.3.2 Technology Domain

Regarding technology, Table 8 shows related to healthcare technology support during the covid-19 outbreak. Most participants highlighted that "Systemized patient reports underwent accurately, Privacy" (strongly agree 20.4% and agree 60.7%). Moreover, "Health care and informatics providers role for files safe" (strongly agree 30.3% and agree 59.7%). Next, HIS uses special alerts for Covid-19 files" (strongly agree 19.0% and agree 64.0%). Table (8): Distribution (%) and mean of questions related to healthcare Technology support during the covid-19 outbreak

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Table 8: Technology Domain

Technology							
Statement	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly disagree**	**Mean**	**Std. Dev.**
Systemized patient's files underwent accurate, Privacy, and reliable information	43	128	32	6	2	2.033	0.746
	20.4%	60.7%	15.2%	2.8%	0.9%		
Health care and informatics providers must keep the covid-19 patients files safe and private	64	126	11	9	1	1.848	0.740
	30.3%	59.7%	5.2%	4.3%	0.5%		
HIS uses special alert for confirmed Covid-19 cases files	40	135	26	8	2	2.04	0.742
	19.0%	64.0%	12.3%	3.8%	0.9%		

4.3.3 Organization Domain

Regarding Organization, Table 9 shows healthcare organization support during the covid-19 outbreak. Most of the participants highlighted that the "HIS manager provides help to the senior manager (Current situation)." (Daily follow-up **84.8**% and monthly visit **15.2**%)**.** Then "Hospital administrators in hospitals support technology systems" indicated (strongly agree 19.4% and agree 65.9%). Finally, "Last year, the health institutions used HIS to compare an average number of weekly visits pre-COVID-19 and during Covid-19." (Strongly agree 12.8% and agree 64.0%). Table 9: Distribution (%) and mean of questions related to healthcare organization support during the covid-19 outbreak.

Table 9: Organization Domain

Organization							
Statement	Strongly agree	Agree	Unsure	Disagree	Strongly disagree	**Mean**	**Std. Dev.**
Hospital's administrators support technology systems in the hospitals	41	139	23	7	1	2.00	0.693
	19.4%	65.9%	10.9%	3.3%	0.5%		
Last year, the health institutions used health information system to provide a comparison between average number of weekly visits pre-COVID-19 and during Covid-19.	27	135	40	8	1	2.15	0.701
	12.8%	64.0%	19.0%	3.8%	0.5%		

4.3.4 Environment Domain

Regarding the environment, Table 10 shows related to healthcare environment support during the covid-19 outbreak. Most participants highlighted that the "Government supports technology in health care facility." With selections (Strongly agree10.9 % and agree 58.8%). Next," HIS provides more facilitated referral between hospitals that have HIS." (Strongly agree 25.6% and agree 56.9%). Then "Other hospitals aspire to get in computerized systems" (Strongly agree 16.6% and agree 66.8%). Finally, "Prefer to grant computerized health system in all health sectors in Palestinian" (Strongly agree 37.0% and agree 50.2%). Table 10: Distribution (%) and mean of questions related to healthcare environmental support during the covid-19 outbreak:

Table 10: Environment Domain

Environment							
Statement	**Strongly agree**	**Agree**	**Unsure**	**Disagree**	**Strongly disagree**	**Mean**	**Std. Dev.**
Government supports the technology systems in the hospitals	23	124	40	16	8	2.346	0.910
	10.9%	58.8%	19.0%	7.6%	3.8%		
HIS at MOH provide more facilitated referral between hospitals that have HIS.	54	120	28	8	1	1.967	0.765
	25.6%	56.9%	13.3%	3.8%	0.5%		
Other hospitals aspire to get in computerized systems in their hospitals	35	141	30	4	1	2.028	0.654
	16.6%	66.8%	14.2%	1.9%	0.5%		
Prefer to grant computerized health system in all health sectors (Private, NGO, UNRWA, and MOH) in our Palestinian country	78	106	20	2	5	2.000	0.827
	37.0%	50.2%	9.5%	0.9%	2.4%		

4.4 Section Three: Relationship Between Adopting HIS and The Following Variables

Table 11 shows that adopting questions have 870 positive opinions, 94%, (Since we have 211 participants. Now, for example, adopting domain had 5 questions each question was answered by 211 participants, so the total answers 211*5 = 1055- 130 neutral answers = 925 answers, 870 of them positive and 55 negative and so on. As it is agreed that strongly agree, agree are positive answers while disagree, strongly disagree are negative answers and ignore neutral answers) while 55 negative opinions with a mean of 1.980 (SD 0.730). Finally, the average for the adoption domain is the sum for the answer divided by the domain questions number, this is done and added for all domains.

Table 11: Frequency distribution of overall participant's opinion by four domains.

Domains	**Mean**	**Standard Deviation**	**Median**	**Positive Opinion**		**Negative Opinion**	
				Average Frequency	**Percentage**	**Average Frequency**	**Percentage**
Adopting	1.980	0.730	2.000	174	94 %	11	6 %
Technology	1.973	0.743	2.000	178.6	95 %	7.6	5 %
Organization	2.177	0.780	2.333	171	95 %	8.5	5 %
environment	2.039	0.789	2.000	170.25	93.8 %	11.25	6.2 %

Relationships between Socio-demographic Variables and Adopting HIS

ANOVA and independent t-test were performed to assess if there were significant differences between both groups at pre-test regarding socio-demographic variables and adopting HIS. The results revealed that there were no significant differences between the groups ($P>0.05$), as displayed in Table 12.

Table 12: Relationships between socio-demographic variables and adopting HIS

#	Factor		Freq.	Mean	Standard Deviation	f/t	P-value
1	**Gender**	Male	161	2.009	0.775	1.307	0.299
		Female	50	1.900	0.752		
2	**Age**	>=30	29	2.000	0.910	2.196	0.349
		31-40 Years	88	1.957	0.813		
		41-50 Years	62	1.816	0.714		
		>50 years	32	2.088	0.873		
3	**Educational Level**	Diploma	13	2.077	0.767	1.537	0.363
		Bachelor	112	1.966	0.824		
		Master	64	1.881	0.805		
		Doctorate	22	1.910	0.743		
4	**Living place**	Same Hospital City	125	2.000	0.765	0.594	0.611
		Same Hospital Governorate	52	1.981	0.772		
		Other Governorate	34	1.930	0.764		
5	**Working period in hospital**	1-5 years	46	2.013	0.720	0.980	0.490
		6-10 years	42	2.040	0.885		
		11-15 years	41	1.927	0.756		
		>= 16	82	1.968	0.722		
6	**Working in hospital**	Doctor	31	1.9161	0.6873	1.352	0.253
		Nurse	73	1.9726	0.7872		
		Management	45	1.9778	0.8582		
		Med Engineer	11	1.8727	0.6499		
		pharmacist	10	1.8800	0.8535		
		Laboratory	15	1.7867	0.6465		
		Computer Department	25	1.9760	0.8598		
		Technician	1	3.4000	0.856		

7	**Position**	Director	41	1.951	0.836	1.195	0.352
		Manager	49	2.021	0.817		
		Coordinator	15	1.853	0.571		
		Head nurse	41	1.980	0.712		
		Computer Department	23	1.913	0.809		
		Staff	32	2.088	0.685		
		Med engineer	9	1.822	0.614		
		Technician	1	3	0.506		
8	**Computer Knowledge**	Beginner with limited computer skills	45	2.080	0.751	1.000	0.458
		Advanced beginner	78	1.959	0.713		
		expert user who is able to assist other	64	1.978	0.849		
		expert with advance training	24	1.900	0.716		
9	**Type of training: Group training**	Yes	117	1.872	0.78	2.698	0.158
		No	94	2.047	0.817		
	Type of training: One to One	Yes	62	1.974	0.755	0.460	0.675
		No	149	1.988	0.771		
	Type of training: User Manual	Yes	22	1.984	0.895	1.016	0.373
		No	189	2	0.75		
	Type of training NO training	Yes	36	2.189	0.828	3.265	0.101
		No	175	1.942	0.745		
10	**Sector**	Public	161	1.929	0.684	4.193	0.194
		Private	28	2.021	1.013		
		NGO	22	1.336	0.847		
11	**Hospital Bed**	30-60	85	2.047	0.875	1.464	0.276
		61-90	42	1.943	0.689		
		91-120	14	1.714	0.752		

		121-150	18	1.822	0.695		
		More than150	52	1.900	0.766		
12	**Hospital Team**	Less than or equal 30	12	1.967	0.800	1.885	0.325
		31-70	26	2.015	0.845		
		71-100	19	2.210	0.780		
		101-150	37	1.968	0.780		
		More than150	117	1.886	0.780		

Relationships between technology, organization, environment variables and adopting HIS.

An independent t-test was performed to assess the significant differences between technology, organization, and environment variables. For organization, the result found there is no relationship between the organization and management support and HIS adoption, as displayed in (Table 13). While for technology and environment there were a relationship with adopting HIS to use in Covid-19 (P-Value< 0.05), as displayed in (Table 13).

Table 13: Relationships between technology, organization, environment variables and adopting HIS.

Domains	**Adopting**			
	Mean	**Standard Deviation**	**F**	**P value**
Technology	2.184	0.759	6.756	0.011
Organization	2.132	0.813	3.878	0.072
Environment	2.158	0.786	5.317	0.041

Multivariate analysis was performed to assess if there were significant differences between groups adopting, technology, organization, and environment at pre-test regarding socio-demographic variables. The results revealed no significant differences between the groups ($P>0.05$), as displayed in (Table 14).

Together, the present findings confirm that the socio-demographic variables do not affect adoption ($P >0.05$). Next, Technology has no effect for ($P > 0.05$), except with 'Working in hospital' ($P<0.05$). Then, organization has no effect for ($P > 0.05$), except regarding 'computer knowledge' and 'Sector' ($P<0.05$). Finally, the environment and socio-demographic has no effect ($P>0.05$) except for 'Living place', 'Position', 'Type of training User Manual', 'Type of training NO training', 'Hospital' and 'Sector' ($P<0.05$) as shown in Table 14.

Table 14: The relationship between socio-demographic variables, adoption, technology, organization, and environment respondents' opinions. (Multivariate analysis)

No.	Factor	Mean	SD	Adopting		Technology		Organization		Environment	
				F	P value	F	P value	F	P value	F	P value
1	**Gender**	1.955	0.764	1.307	0.299	2.541	0.054	2.560	0.056	0.669	0.594
2	**Age**	1.965	0.828	2.196	0.349	1.217	0.282	1.414	0.179	1.180	0.294
3	**Educational Level**	1.959	0.785	1.537	0.363	1.657	0.097	0.861	0.561	1.090	0.369
4	**Living place**	1.970	0.767	0.594	0.611	1.160	0.290	0.351	0.909	2.303	0.022
5	**Working period in hospital**	1.987	0.771	0.980	0.611	0.934	0.495	0.607	0.791	0.506	0.910
6	**position**	2.079	0.694	1.195	0.352	1.588	0.47	0.630	0.895	1.562	0.037
7	**Working in hospital**	2.100	0.778	1.352	0.253	1.704	0.026	1.314	0.156	0.973	0.506
8	**Computer Knowledge**	1.979	0.757	1.000	0.458	0.649	0.755	2.462	0.010	1.532	0.109
9	**Type of training group training**	1.960	0.799	2.698	0.158	1.774	0.153	1.226	0.301	2.035	0.091
	Type of training one to one	1.981	0.763	0.460	0.675	1.248	0.293	0.429	0.733	0.213	0.931
	Type of training User Manual	1.992	0.823	1.016	0.373	0.303	0.823	1.429	0.236	2.665	0.034
	Type of training NO training	1.066	0.787	3.265	0.101	2.428	0.067	2.210	0.088	2.982	0.020
10	**Governorate**	1.762	0.848	0.939	0.512	0.660	0.824	1.302	0.196	0.568	0.935
11	**Hospital**	1.993	0.658	4.193	0.194	1.326	0.081	1.056	0.365	1.664	0.000
12	**Sector**	1.762	0.848	4.193	0.194	2.013	0.062	2.253	0.038	4.458	0.000
13	**Hospital Bed**	1.885	0.775	1.464	0.276	0.293	0.990	1.038	0.412	0.676	0.819
14	**Hospital Team**	2.001	0.797	1.885	0.325	0.754	0.698	0.919	0.184	0.920	0.546

4.5 Section Four: Qualitative Findings

This section summarizes the findings and contributions made regarding the interview. Qualitative semi-structured interviews were conducted with 12 hospital directors and computer experts. Interviews were conducted between 6/11/2021 and 11/1/2022. Each person was directed to a different room respectfully. Every interview was about ten to fifteen (10-15) minutes. Eight questions for admin members and six for IT managers, as shown in appendix B. Fifteen managers and experts participated in our interviews. Fourteen were males (93%), the others were females (7%). For the hospital Governments, "Government" were Jenin (20%), NABLUS (20%), QALQILYA (20%), TULKAREM (20%), and SALFEET (20%). The Hospital Sectors: Public 5 (42%), Private 3 (25%), and NGO 4 (33%). Positions: Hospital Manager 1 (7%), Administration Manager 4 (27%), Nursing Manager 4 (27%), Quality Manager 1 (7%), IT Manager 5 (33%). See the data presented in Figure 8.

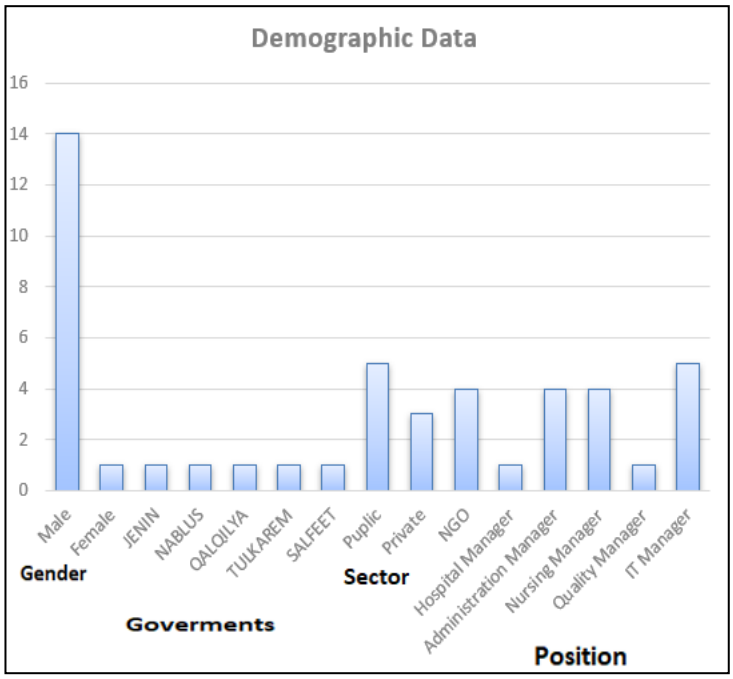

Figure 9 : Demographic for all Participants

4.5.1 The First Part of The Interviews With The Hospital Manager

The researcher introduced ten themes in this part (Appendix J). As described below:

1- **The System Used Here**: Important decision of the management team, the hospital needs a patient file management system. On both medical and financial, all management teams care more for the finance side to be computerized. The researcher labeled interviews as shown in Table 15 and Figure 10.

2- **Mix Percentage:** It is a mix for the hospital between medical and finance use. Even if the hospital has the system, it still has on paper since they don't have a link with the internal ministry for registration for newborns. The researcher labeled interviews as shown in Table 16 and Figure 11.

3- **Use of "Note Templates":** From MOH for every hospital, these templates for getting needed answers about COVID-19-related illness symptoms. This crucial information needs to be dealt with and written in the patient medical record. All hospitals at the beginning of the pandemic did use the template but differed in saving the papers. The researcher labeled interviews as shown in Table 17 and Figure 12.

4- **Standards Dependent on facing Covid-19:** In a non-equal battle, one must consider the correct directions to get strength. Now, each member is a part of creating, discussing, receiving WHO and MOH recommendations, getting accumulated previous day's cases, and modifying the plan according to what happened. The researcher labeled interviews as shown in Table 18 and Figure 13.

5- **New Hospital and Standards Dependent on Covid-19:** In a non-equal battle, new hospitals are more specific to the needed target. For this reason, getting strength is necessary to be in the correct direction. Here managers remove check steps to be replaced with treatment steps. Some managers say it is better to initiate computerized HIS in (Covid-19) centers. The researcher labeled interviews as shown in Table 19 and Figure14.

6- **Is New Hospital compatible to Face Covid-19 or not?** Do new hospitals after the needed strength, can handle the big duty!. Some in the management team started establishing new plan points for employees. They started training and explaining to employees on new protocols. All are engaged effectively. Some new hospitals did take the better way with computerized HIS. Other managers mentioned that new nurses were brought to hospitals and did the same cases on HIS. Another manager added that we must send to hospitals (Covid-19 Centers). Finally said that he does not know about the procedure in (Covid-19 Centers) and this indicates that more communication is needed, especially for managers not on the emergency committee. The researcher labeled interviews as shown in Table 20 and Figure 15.

7- **Data Archiving:** The process that starts from the patient first comes to the medical institute until leaving it. With is essential factors from quickness and correct saving manner. The hospital director mentioned the steps for archiving in his hospital, starting from the paper system and now the HIS system. The other manager did give a relief word that he has computerized HIS. Finally, other hospitals still use the manual system, as in Table 21 Figure 16.

8- **Data Retrieving:** The process that allows medical users to get needed information for the patient, getting the signs required for the patient and his Covid-19. The hospital Director mentioned the steps starting from the Paper and HIS systems. Quality Manager said: "It was very easy, for the patient and we use reporters and get the information and analyze it and use tools to analyze it. The researcher labeled interviews as shown in Table 22 and Figure 17

9- **HIS Support Manager Position:** Some managers team up for this subject. It is important to ensure his power in monitoring. This was effective for the dependent. The researcher labeled interviews as shown in Table 23 and Figure 18.

10- **For Your Decisions During the Covid-19 Pandemic, how did you get the Feedback:** All managers made decisions, and all did reply. It is important to know the impact of the high decision from many sites, especially HIS. This is important since it is related directly to the hospital, employees, and patients. Managers in replaying did change, private hospitals manager replied: “need feedback from 2 sides. Financial side since we are a private hospital. Second part in the patients, as cases and did they benefit from the treatment ", but a direct reply said from NGO manager: "we aspire to have a fully computerized system in the future, and we are working on this." The final Manager said: this is the information we need "HIS helped us to know what we needed. The researcher labeled interviews as shown in Table 24 and Figure 19.

4.5.2 The Second Part of The Interviews With Computer Experts

Continue for 4.5.1 illustration previously the researcher introduced seven themes in this part (Appendix K).

As described below:

1. **Infrastructure Update.** Only two hospitals did update the infrastructure. The rest did not. The major present of participants kept things as it is and brought a new computer. The researcher labeled interviews as shown in Table 25 and Figure 20.

2. **Dealing with Numerous Data Resources and Facing the Widespread lack of Clinical Information Standards:** Only public hospitals deal with a Centrally Database, while other hospital sectors data storage place, in hospital, we had no problems. The researcher labeled interviews as shown in Table 26 and Figure 21.

3. **Internal Acceptance and Ability for Information Sharing:** Most lack system compatibility, resulting in data unavailability. Because not all hospitals accept information sharing, each has its program language. NGO hospitals have no sharing information between hospitals, only the MOH website. While only public hospital sharing protocols are used and applied. The researcher labeled interviews as shown in Table 27 and Figure 22.

4. **Depending on Health Level 7 (HL7) Standard Protocol in the Hospital:** it is only found in MOH hospitals, not other hospitals. The researcher labeled interviews as shown in Table 28 and Figure 23.

5. **Using HL7 for the Covid-19 Patient:** Almost all answers in the same tone. The other hospital dares to prefer owning this electrical system and abandoning the system they have. The researcher labeled interviews as shown in Table 29 and Figure 24.

6. **Depending PACS System in the Hospital:** Radiology devices take the photos, those photos are converted to the system, then the system goes to the PACS system, and it will be available any ware in Palestine. Great purpose, almost agreed by all. The researcher labeled interviews as shown in Table 30 and Figure 25.

7. **Using PACs System for Covid-19 Patient:** Radiology devices take the photos, those photos are converted to the system then the system goes to the PACS system, and it will be available any ware in Palestine. Great purpose agreed from all. The researcher labeled interviews as shown in Table 31 and Figure 26.

Chapter Five:
Discussion and Conclusion

5.1 Introduction

The primary purpose of this research is to explore the perceptions of HIS users on the essential factors affecting adopting, updating or upgrading HIS systems during the COVID-19 pandemic in government and non-governmental hospitals. In this section, the researcher addresses the study's findings in terms of causes and how they compare to earlier worldwide investigations. This section addresses the study's findings in terms of causes and how they compare to earlier worldwide investigations. The quantitative portion of the research confirmed the conclusions from the literature.

In keeping with the study's assertion that various organizational theories, such as institutionalism and Human Organizational Technology (HOT) fit design, were combined to comprehensively understand the environmental, technology, and administrative aspects of HIS adoption. Thereby assisting hospital executives or decision-makers in developing phases in the HIS adoption pattern(Hossein Ahmadi et al., 2018).

Since the null hypothesis posits that it relies on insufficient evidence and requires additional testing to determine whether the data point is true or false, the researcher will add an alternative hypothesis if needed. Rejecting the null hypothesis opens the door to more testing to see if there is a relation between the two variables (Null Hypothesis - Overview, How It Works, Example, n.d.)(Onainor, 2019). A large statistical significance (low p-value) demonstrates that continuing research in this area may be worthwhile, as the experiment demonstrated an effect. On the other hand, larger p-values reveal that your possible experimental scenarios are insufficient to investigate the relationship you are interested in. This means you can leave it as is or alter your experiment or sample size to take a closer look(What Does It Mean to Have a Null Hypothesis Accepted?, n.d.).

This paper discusses informatics reaction and experience in replying to the COVID-19 epidemic in Palestine hospitals through a health informatics lens. Personal health records, clinical information systems, and big data infrastructures of the future should be capable of rapid adjustment to health care, such as through good interface design and information sharing. Also, If large amounts of information are shared, users' privacy should be protected(Ye et al., 2020).

In addition, this chapter presents the conclusion, recommendations, the strength of this study, and future studies.

5.2 Effect of The Demographic Characteristics

Our findings reported no effect of demographic characteristics of HIS on HIS adopting to usage in facing Covid-19. On the contrary, new studies confirmed that gender, age, indigenous identity, ethnicity, and rural or urban context may all play a part in preparedness and service delivery levels.(Government of Canada, 2020). In the same line, other researcher mentioned the importance of knowledge for employees, workers (people or human resources) are a business's most precious asset, and proper human resource management is critical for the organization to achieve significant strategic and legal success. Many firms postpone adopting innovation due to a shortage of skills and technical expertise required in the development process. As a result, those firms must wait till sufficient technical competence is available. Thus, if firms have employees who are better knowledgeable about ISs, they will be more likely to implement HIS(Hossein Ahmadi et al., 2017).

Moreover, another study wrote about the end users and how it is better with more understanding, knowledge, and qualification. A 'champion' for HIS can characterize this communication and ensure that end users are kept up to date on the implementation's progress. End users should be involved in all parts of the deployment and be aware of the possible benefits, so they are prepared to bear the unavoidable interruption. It is also critical to have enough time and resources to provide quality information technology training and support. End users must be confident that they can utilize the technology and that it will function properly. Individuals within the organization are more likely to support and utilize the HIS if they understand the advantages of care and know that all steps have been made to mitigate potential hazards.(Sligo et al., 2017) .

5.3 Effect of The Hospital Characteristics

Regarding the hospital characteristics there was no effect on the HIS adoption to usage in facing Covid-19. In this study, the hospital was manipulated to present the relationship managing between adopting HIS and hospital features. Important factors are listed in this subject, starting from the hospital in government, sector, hospital beds, and hospital team's number. In the same line as current work, that the hospital characteristic has no effect on HIS adoption. Other researcher talked about the size attribute, (Hossein Ahmadi et al., 2018) with findings as the study's sole moderator, had no significant effect on the other relationships in our constructed theoretical model. to explain more, the impact of this key factor on HIS adoption are all the same in three Malaysian government hospitals: for small hospitals, medium hospitals, and the large hospitals.

On the contrary, hospital characteristics affect HIS adoption to use in Covid-19. It is important to offer more in attributes such hospital beds and size. Also, speaking about the importance of the hospital as a factor in the primary goal of bringing the COVID-19 outbreak under control In addition, the researcher added that the number of designated hospitals that can effectively administer COVID-19 is restricted in terms of bed availability, human resources, and resources. To address a significant shortage of hospital beds in Wuhan, the Chinese government chose to convert stadiums, conference specialist centers, and classrooms into infectious disease "Ark Hospitals" (temporary hospitals erected from preexisting nonmedical facilities). Our Ark Hospital only accepts patients with minor COVID-19 symptoms; patients with severe disorders are sent to tertiary care facilities(Zhu et al., 2020).

In addition, another study from the Malaysian public hospitals. Prior studies of organizational adoption of innovations have underlined hospital size impact. Larger hospitals, according to Chang, are more likely to use E-signature than smaller hospitals. They imply that major

hospitals have more resources to change their business approach. As a result, hospital size substantially impacted the decision to employ innovative technology.(Hossein Ahmadi et al., 2015).

5.4 Effect of The Technology Support

Our study found a relationship between technology and adopting HIS to use in facing Covid-19. Mainly two factors i.e. ‘Compatibility ‘, and ‘Security and safety have a hugely positive effect on HIS adoption\ usage in facing Covid-19’. The researcher attributes the result to Service Quality. Moreover, the researcher emphasizes linking HIS with Government strategic decisions to achieve the benefit. In addition, to put the patient tests, results, and medical information on a specific utilizable portal web page.

It is found that there is a compatibility impact for HIS in hospitals during Covid-19, in this research and other work. This is in line with a study (Hossein Ahmadi et al., 2017), which confirmed that complex systems are being built today because of new existing technologies. Advanced software tools and equipment at low prices, as well as dependable networking and regulations, bring a unique perspective to this file. ‘Picture Archiving and Communication System (PACS) is an example of a gradually combined HIS semi into wholly integrated system. Regarding the adoption of HL7 technology in the hospital setting, most study respondents stated that HL7 implementation was incommensurable with their current IT architectures in terms of software, hardware, applications, or infrastructures that introducing HL7 into traditional principles was difficult for their IS personnel.

Furthermore, the previous expertise of IS professionals was regarded as crucial in adopting HIS and appraising IS as an investment. As a result, the degree of system compatibility is a significant aspect of the technological dimension. As a result, we suggested a theory for HIS implementation in hospitals, Hypothesis: "Compatibility has a positive effect on the hospital’s adoption of HIS”.

Regarding compatibility, new programs are asking for better nowadays. This is mentioned in this study (Shahzad et al., 2021) which emphasizes that when there is a high level of compatibility, companies require few alterations and revisions. As a result, IS adoption opens

more. Compatibility has a direct impact on HIS adoption. As technology improved, more complicated systems such as advanced hardware and software and better-evolved networking systems became available. As a result, the following theory is proposed: “Compatibility has a positive impact on the adoption”. Finally, as a result, it is supported.

Based on the results, the most important factor affects HIS adoption to usage in Covid-19 was “Security and safety". Data security is a major problem in the healthcare industry when utilizing Information and Communication Technology (ICT). In the same line, a study (Hossein Ahmadi et al., 2017) found that medical behavior or procedure is tightly connected to a patient's situation or privacy and security. Therefore, all healthcare providers should take information security and correctness seriously, with an intent to punish any probable faults.

Nevertheless, evidence has grown that computer systems in various companies are prone to repetitive and chronic exploitation. Continued in Malaysian public hospitals, the level of security concern in HIS was described as high due to the worry of breach of patient confidentiality during the transmission process. It discovered that a distributed system's most significant issue of relevance is the security issue. This issue may be especially relevant in hospitals, where healthcare information requires a more stable environment during storage and retrieval. Moreover, privacy concerns are a major problem in the healthcare industry.

As a result, the researcher suggested a hypothesis for the adoption of HIS: ' hospital's greater security concern has a positive influence on the hospital's adoption of HIS. Finally, this hypothesis is validated.

Other Researchers did mention security in their study (H Ahmadi et al., 2014). Since security is a sub-factor for the Administrative, a major Element of implementation for HIS, each system has its level of security, and privacy laws are of the utmost importance. Each staff member has a unique ID and password for the store and other areas. They are advised to utilize various passwords.

5.5 Effect of The Organization and Management Domain

In the organization context, findings indicates that organization and management support does not affect HIS adoption in Covid-19. So that ‘The help of senior management does not affect HIS adoption\ usage in facing Covid-19. On the contrary, studies confirm it has an effect. In addition, studies confirm that hospital administrators support technology systems in the hospital to face Covid-19. Another study (Shahzad et al., 2021) found that upper executives' support strongly benefits HIS adoption. In addition, the results indicated that there is a significant positive association between upper executives and HIS adoption. Because of its significance in resolving difficulties related to IT growth in hospitals, senior management support is regarded as the most crucial factor influencing HIS adoption in any organization.

Moreover, another study did write on the same subject. Top management support refers to whether top management understands HIS technology's nature and purposes. As a result, it fully supports its development. Furthermore, the researcher argued that senior management's approach is beneficial in adopting innovative technologies, particularly when they understand the benefits and drawbacks of IT and have specific IT-related expertise or experiences. Top management support was critical for implementing PACS innovation in the healthcare domain and context of HIS (Hossein Ahmadi et al., 2017).

Regarding the use of HIS to compare patient visits pre and during COVID-19, results found that it is consistent with the researcher who explained that understanding how health information systems are used in epidemic response or how it works at various stages of this epidemic. Isolation and care are the most successful techniques for controlling infectious diseases; all attempts to manage the epidemic focus on these two goals, as proved in China. A framework added comprises players in health informatics, technologies, service recipients, and application scenarios centered on the four distinct phases of the COVID-19 epidemic: first: detection, early reaction, intervention, and following the intervention. Tracing human activities is a key way to locate the distribution of COVID-19 infection and regulate virus

propagation. Individual health information related to healthcare QR codes is an excellent way to track and control people's movements. It is also critical to employ information technology to promote the accessibility of epidemic information, minimize public panic, and boost public confidence in epidemic-fighting tactics. (Ye et al., 2020).

The researcher comments that the Covid-19 pandemic needs offer from all positions in the hospital. Everyone is in their place, not only managers. This situation did illustrate that plans needed and prepared by Governmental high levels for all hospitals and health workers.

5.6 Effect of The Environment Domain

Both factors ‘government and competitors’ pressure have a hugely positive effect on HIS adoption\ usage in facing Covid-19’. The results concerning the coercive pressure for HIS in hospitals during Covid-19 align with the study (Shahzad et al., 2021). This study confirmed that it is applied to organizations when they depend on other organizations and societal and cultural assumptions.

Furthermore, stakeholders may apply coercive pressure to achieve their expectations. Organizational reliance on stakeholders (customers, traders, and government regulatory bodies) may apply coercive pressure on the corporation to adopt new business methods, referred to as coercive pressure. Furthermore, the government's coercive pressure forced the firm to implement innovation in information systems (IS). Only among the environmental elements, government regulations, rules, and incentives for HIS adoption may lead to HIS adoption. Government pressure and benefits for effective HIS implementation drive hospitals to embrace IS innovation. As a result, they put forward the following hypothesis: “Coercive pressure from government positively influences the HIS adoption”. Finally, in the results, it is supported.

The author (Hossein Ahmadi et al., 2017) did dig more for this issue. However, only a few works have dealt with this topic. The rest did not specifically employ the conceptual framework and identified government policy as a driving factor or environmental pressure significantly linked towards the adoption of HIS in hospitals, which is akin to coercive and demonstrates a strong to the institutional theory. Furthermore, the government established related regulations that covered a variety of guidelines or marketing programs to encourage HIS adoption, which resulted in institutionalized HIS hospitals. As a result, they put forward the following hypothesis: “Coercive pressure from the government has a positive effect on the hospital’s adoption of HIS”.

Since other hospitals aspire to get computerized systems in their hospitals, the current research results found the adoption is effective. This result is consistent with the study (Hossein Ahmadi

et al., 2017), which added that external influences, including competitors' pressure, would be detailed, followed by an understanding of vendor support. As a result, it can be claimed that the environmental dimensions of a hospital influence HIS adoption. Mimetic forces are those that urge organizations to replicate the actions of other institutions in their surroundings. Hospital organizations feel pressured to implement HIS innovation when they witness other hospital groups in the same chain employing the HIS in their operations.

Furthermore, mimetic influence considerably impacts the decision to accept HIS innovation. They feel that emerging countries (competitors) are establishing health information systems to acquire a competitive advantage and be seen kindly by the patients. In some cases, potential HIS adopters may be exposed to mimetic influence from competitors. As a result, the following theory might be proposed regarding the impacts of mimetic pressure: hypothesis:" Mimetic pressure from competitors has a positive effect on the hospital's adoption of HIS". Finally, as a result, it was supported (Shahzad et al., 2021).

5.7 Conclusion

Recently, there has been a big concern for Covid-19 and its effects as a significant worldwide issue. This study aimed to explore “Essential factors for adopting hospital information system during Covid-19 Pandemic: a case study from Palestine”. The rest of this section addresses the study’s conclusion, recommendations, strengths, future research, and summary.

The primary goal of this research was to determine the critical elements influencing the adoption of HIS in the Palestinian government and non-government hospitals using the TOE framework.

To improve HIS adoption, initiatives should be done on ‘compatibility’ and ‘security & safety’ as a technology domain. Moreover, more work should be done to improve environmental domain, and especially ‘Government pressure’ and ‘Competitors pressure’ as it have an impact on HIS adoption.

Demographic characteristics of participants, hospital characteristics and management support from the organization dimension did not affect the adoption of HIS. More testing and confirmation could be used. For these points, more research is required.

5.8 Contribution

This study sheds light on essential factors for adopting HIS in the Covid-19 pandemic situation in Palestine. First, there is limited literature on Covid-19 and HIS in hospitals. In the case of Palestine, few studies are accessible on HIS. Nonetheless, many of these studies studied HIS and indicate the successful tale of HIS adoption in hospitals, both governmental and non-governmental.

However, connecting Covid-19, hospitals, and HIS is exceptionally uncommon. The researcher highlights various concerns linked to HIS adoption factors and examines the Administration's decisions to adopt HIS. As a result, no study is available that provides comprehension of the factors influencing the adoption of HIS depending on each sector decision, such as public, private, and NGO hospitals (governmental, non-governmental) during Covid-19 in Palestine.

This study is the first of its kind in Palestine that highlights the necessity to link all hospitals with HIS to stand against Covid-19. By linking Covid19 test results and Covid-19 vaccine with HIS system to increase the Security & Safety impact against covid19 and to increase the compatibility in the hospital on the HIS adoption and usage against Covid-19.

The researcher hopes this study reaches the decision-makers to sound the alarm and work to overcome difficulties and remove obstacles towards a comprehensive and significant action to combine all hospitals from all sectors to use HIS and be included in one database under one umbrella.

The technology dimension is a critical component in HIS implementation. Furthermore, throughout the COVID-19 outbreak, medical situations and technical support operations have changed dramatically. For these reasons, healthcare technology has proven to be essential in fighting the COVID-19 pandemic (Ye et al., 2020)(H Ahmadi et al., 2014)(He et al., 2021)**.**

As shown in Appendix L (Table 32), the current research Essential Factors for Adopting Hospital Information System (EFAHIS) with six recent international cases research shows approximately thirteen features supported and one not supported.

Finally, the results used by the study administration achieved the goal for which the study was set to investigate.

5.9 Recommendations

Based on the results of the current study, the researcher recommends the following:

1. The researcher suggests linking Covid19 test results and Covid-19 vaccine with the HIS system to increase the relative advantage impact against covid19 and to increase the compatibility in the hospital on the HIS adoption and usage against Covid-19.
2. Increasing the level of all staff training of complete HIS use.
3. Stop using the paper system in hospitals and use computerized archiving to old paper files using HIS (free of paper hospitals).
4. Contacting between departments, management staff, and hospital staff using HIS system.
5. It is necessary to develop and collect ideas, particularly from the brainstorming process, for these plans to provide unique outcomes, which can be viewed as a creative concept for reacting to a public health issue.
6. For Palestine, the Ministry of Health must use more effort and new advanced methods to control Covid-19 spread by changing old ways of detection and depending on new forms. These methods provide health information and new technologies for diagnostic and therapeutic approaches.
7. Regarding for the technical domain, Governor must establish new policies to store and share big data effectively and to develop predicting techniques.

5.10 Strength of The Study

The study's strength originates from the fact that it is the first in Palestine to identify the critical criteria for adopting HIS, both positively and negatively. In addition, it can be used by other researchers as a baseline data. The study emphasized the essential factors that are contributing currently or in the future to adapt HIS in Hospitals. The study provides highly essential

information to decision-makers about the reasons for using HIS in the face of Covid-19. This allows them to take the necessary practical actions in this or similar situations.

5.11 Future Work

The researcher recommends conducting a study on the impact of the essential factors of hospitals on a large scale in Palestine. Equally important is exploring the factors of adopting HIS in all hospitals in Palestine. In fact, this study opens the door for other factors like hospital size and hospital infrastructure. There is a need for more research to give more accurate and comprehensive results. Moreover, this research was carried out in public, private, and NGO hospitals. It is recommended that future research broadens the scope of the current study by incorporating some other UNRWA hospitals.

5.12 Summary

The COVID-19 virus is going on a worldwide pandemic path, and our expertise in the novel coronavirus is expanding. Responding to the COVID-19 outbreak requires global health information systems practitioners to be proactive and apply their professional expertise. In practice, health data technologies play a critical role in reacting to the COVID-19 outbreak. As a result, the researcher suggests that health informatics communities in all nations should respond immediately and wholly utilize health information technology to combat the epidemic(H Ahmadi et al., 2014).

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Appendix

Appendix A: Questionnaire (Quantitative)

https://ee.kobotoolbox.org/80x8SCZj

Essential factors for adopting hospital information system during covid-19: a case study from Palestine

A questionnaire on the Essential factors for adopting hospital information system during Covid-19 Pandemic: a case study from Palestine.

We're conducting research on Essential factors for adopting hospital information system during covid-19. We'd love to hear from you about what hospital information system you use and how you use within the organization.

We did obtained permission from the Ministry of Health to distribute the questionnaire. This will help us make improvements to the existing hospital information system and prioritize new features. The survey should only take 5 minutes. and your responses are completely anonymous. You can only take the survey once, but you can edit your responses until the survey is submitted. Questions marked with an asterisk (*) are required.

If you have any questions about the survey, please email us. We really appreciate your input.

Researcher: Ahmad "Mohamad Rayeq" Ahmad Abusalha

Mobile: 0599134948 - Mobile2: 0562401164

Email: a.abusalha@student.aaup.edu

Supervisors: Dr. Mohammed Moreb.

Section A

Demographic Data

Gender

- ◯ Male
- ◯ Female

Age (years)

- ○ ≤ 30 years
- ○ 31-40 years
- ○ 41-50 years
- ○ >50

Your Qualification

- ○ Diploma
- ○ Bachelor
- ○ Master
- ○ Doctorate

Living place

- ○ Same Hospital City
- ○ Same Hospital Governorate
- ○ Other Governorate

Working Period in Hospital

- ○ 1–5 years
- ○ 6–10 years
- ○ 11-15 years
- ○ ≥16 years

Your work :

In Hospital ..

- ○ Doctor
- ○ Nurse
- ○ Management
- ○ Med. Engineer
- ○ Pharmacist
- ○ Laboratory
- ○ Computer Dept.
- ○ Technician

Your Position in Work:

- ○ Director
- ○ Manager
- ○ Coordinator
- ○ Head nurse
- ○ Computer Dept.
- ○ Staff
- ○ Med. Engineer
- ○ Technician

Your Computer Knowledge/Experience:

- ◯ Beginner with limited computer skills.
- ◯ Advanced beginner
- ◯ Expert user who is able to assist others independently.
- ◯ Expert with an advanced training.

Type Of Training on Health information system (HIS), (if done):

Select One or More

- ☐ Group Training
- ☐ One to One Training
- ☐ User Manual Reading
- ☐ None

Government

Place of Hospital..

◯ Jenin ◯ Nablus ◯ Qalqilia ◯ Tubas ◯ Tulkarm ◯ Ramallah ◯ Salfeet ◯ Jericho ◯ Hebron ◯ Beit Jala

Hospital Name in Jenin:

- ◯ Jenin Goverment Hospital
- ◯ ALRAZI Hospital
- ◯ SHIFA Hospital
- ◯ IBN SINA SPECIALIZED Hospital

Hospital Name in Nablus:

- ◯ Rafidia Hospital
- ◯ Al-Watani Hospital
- ◯ ST.LUKE'S Hospital (Alainjil)
- ◯ Specialized Arab Hospital
- ◯ Nablus Speciality Hospital
- ◯ Women's Union Hospital
- ◯ An- Najah National University Hospital
- ◯ Al-Shuhada Military Medical Complex
- ◯ Red Crescent Hospital-Nablus

Hospital Name in Qalqilia:

- ◯ Darwish Nazzal Hospital
- ◯ QALQILYA HOSPITAL - UNRWA
- ◯ Azzoun Hospital

Hospital Name in Tubas:

- Tubas Goverment Hospital
- Kashda Hospital

Hospital Name in Tulkarem:

- Tulkarm Goverment Hospital
- Al-Zakat Hospital
- Red Crescent Hospital-Tulkarm

Hospital Name in Ramallah :

- PMC (Palestine Medical Complex)
- Palestinian Venezuelan Ophthalmic Hospital
- Hclinic Hospital

Hospital Name in Salfeet :

- Salfeet Goverment Hospital

Hospital Name in Jericho:

- Jericho Goverment Hospital

Hospital Name in Hebron:

- Gov. Hebron Hospital
- Yatta Hospital
- Al Ahli Hospital

Hospital Name in Beit Jala :

- Beit Jala (Al Housain) Hospital

Sector

For the Hospital

Public | Private | NGO | UNRWA

Hospital Beds:

30-60 | 61-90 | 91-120 | 121-150 | >150

Hospital Team

≤ 30 | 31-70 | 71-100 | 101-150 | >150

Section B

Technological, Environmental, organizational factors and using HIS during Covid-19.

1. HIS manager provides help to the senior manager (Current situation):

   Daily follow up Monthly Visit

2. During the Covid-19 period, using the health information system (HIS) supported identifying the Covid-19 cases.

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

3. My overall satisfaction with using HIS has increased during the Covid-19 period.

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

4. Government supports the technology systems in the hospitals

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

5. HIS at MOH provide more facilitated referral between hospitals that have HIS.

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

6. Systemized patients files underwent accurate, Privacy, and reliable information

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

7. Hospital's administrators support technology systems in the hospitals

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

8. Health care and informatics providers must keep the covid-19 patients files safe and private

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

9. HIS uses special alert for confirmed Covid-19 cases files

   ○ Strongly agree ○ Agree ○ Neutral ○ Disagree ○ Strongly disagree

10. Hospital medical team use HIS intensively during Covid-19.

Strongly agree Agree Neutral Disagree Strongly disagree

11. Hospital directors and administrations utilize HIS effectively during Covid-19.

Strongly agree Agree Neutral Disagree Strongly disagree

12. Other hospitals aspire to get in computerized systems in their hospitals

Strongly agree Agree Neutral Disagree Strongly disagree

13. Prefer to grant computerized health system in all health sectors (Private, NGO, UNRWA, and MOH) in our Palestinian country.

Strongly agree Agree Neutral Disagree Strongly disagree

14. Last year, the health institutions used health information system to provide a comparison between average number of weekly visits pre-COVID-19 and during Covid-19,

Strongly agree Agree Neutral Disagree Strongly disagree

15. Adopting HIS supports vaccine program during covid-19.

Strongly agree Agree Neutral Disagree Strongly disagree

Appendix B: Questionnaire (Qualitative) for Admins

Title: “Essential factors for adopting hospital information system during Covid-19 Pandemic: a case study from Palestine”

Interview Questions:

I. Hospital Manager:

1. Your hospital does have a health information system (HIS), to deal with the patient medical files.

   a) What system is used here.?

Is it Computerized, Paper or Mix? If it is Mix, please explain. and the?

   a) What is the Mix Percentage?
   b) Why it is not 100% Computerized?

2. "Note Templates" enabled Clinicians in quickly gathering vital clinical data while minimizing documentation burden by simplifying and digitizing as much of the note as possible, for COVID-19-related illness symptoms (Salway et al., 2020).

   a) Was this used in Hospital, especially in first process when patient come to hospital, in Sorting Area “screening tent”?

3. Your hospital did face Covid-19, what is the standards that were used and dependent in the hospital?

4. For New Hospitals, Opened During the Covid-19.

   a) On what Standards they relied?

   b) Are this Hospitals compatible to Face Covid-19 or not?

5. Please describe how data archiving, such as how quick it is, how good it is, and so on.

6. Please describe how data retrieving, such as how quick it is, how good it is, and so on.

7. How HIS support your position in decision support system.!

If your information was supported from HIS with the daily true date?

8. For Your Decisions during Covid-19 pandemic, how you get the feedback?

Appendix C: Questionnaire (Qualitative) for Computer Department.

1. Your hospital does have a health information system (HIS), to deal with the patient medical files.

    a) What system is used here.?

    Is it Computerized, Paper or Mix? If it is Mix, please explain. and the?

    b) What is the Mix Percentage?

    c) Why it is not 100% Computerized?

2. For IT infrastructure in Hospital, was there any update for facing the Covid-19 pandemic.. (He et al., 2021)?.

3. Data storage issues might occur as a result of the numerous data sources and formats, as well as a lack of widespread adoption of clinical programs and standards that allow health data exchange and health information system communication(Samra et al., 2020).

    a) How did your hospital solve and deal with this issue?

4. One of the biggest disadvantages of obtaining a patient health medical record is the absence of system compatibility, which results in data unavailability. Because not all hospitals accept information sharing, their medical data will be unable to access the relevant databases(Samra et al., 2020).

    a) How did your hospital address and resolve this issue?

5. The Health Level 7 (HL7) standard protocol is used to integrate all the clinical care resources. it is used with laboratory Devices to send laboratory test results.

    a) Is it used in your hospital?

    b) Is it better for Covid-19 patients tests?

6. The PACS system is a medical imaging technology, link in all modalities with digital output. it is used with Radiology Devices to send Radiology test results.

    a) Is it used in your hospital?

    b) Is it better for Covid-19 patients tests?

Appendix D: AAUP Approval Letter for MOH.

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2021-10-9

حضرة د. عبد الله القواسمي المحترم

رئيس وحدة التعليم الصحي والبحث العلمي في وزارة الصحة الفلسطينية

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **احمد "محمد رايق" احمد أبو صالحه** والذي يحمل الرقم الجامعي 201912952 وهو طالب ماجستير في الجامعة العربية الامريكية تخصص المعلوماتية الصحية، ويعمل على رسالة بعنوان **"العوامل الأساسية لاعتماد نظام معلومات المستشفى خلال كوفيد -19: دراسة حالة من فلسطين". تحت اشراف د. محمد مرعب.** نأمل من حضرتكم الايعاز لمن يلزم لمساعدته في الحصول على المعلومات اللازمة للدراسة، علما" ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أعطيت هذه الرسالة بناء" على طلبه.

وتفضلوا بقبول فائق الاحترام

د. شاهيناز نجار

عميد كلية الدراسات العليا

كلية الدراسات العليا
FACULTY OF GRADUATE STUDIES

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E-mail: FGS@aaup.edu ; PGS@aaup.edu Website: www.aaup.edu

Appendix E: MOH Approval.

State of Palestine
Ministry of Health
General Directorate of Education in
Health and Scientific Research

دولة فلسطين
وزارة الصحة
الإدارة العامة للتعليم الصحي
والبحث العلمي

Ref.: .....
Date:.....

الرقم: ٢٠٢١/٥٩٠/١٦٦
التاريخ: ٢٠٢١/١١/٢٨

الأخ مدير عام الادارة العامة للمستشفيات المحترم،،،
عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،
تحية واحترام،،،

الموضـــوع: تسهيل مهمة بحث

يرجى التكرم بتسهيل مهمة الطالب: **احمد "محمد رايق" ابو صالحة، ماجستير معلوماتية صحية– الجامعة العربية الامريكية**، لعمل بحث بعنوان:

"العوامل الاساسية لاعتماد نظام معلومات المستشفى خلال كوفيد–19: دراسة حالة من فلسطين"

حيث سيقوم الطالب بجمع معلومات من خلال عمل مقابلات وتعبئة استبانة، مع العلم أن

مشرف الدراسة: د. محمد مرعب.

وذلك في: – **جميع المستشفيات الحكومية وجميع مستشفيات كورونا**

– **مجمع فلسطين الطبي**

على ان يتم الالتزام بجميع تعليمات واجراءات الوقاية والسلامة الصادرة عن وزارة الصحة بخصوص جائحة كورونا، وتحت طائلة المسؤولية.

على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر.

مع الاحترام،،،

دولة فلسطين
د. عطاالله القواسمي
مدير التعليم الصحي والبحث العلمي
وحدة التعليم الصحي والبحث العلمي

نسخة: عميد كلية الدراسات العليا المحترم/ الجامعة العربية الامريكية

P.O .Box: 14
Telfax.:09-2333901
scientificresearch.dep@gmail.com
ص.ب. 14
تلفاكس: 09-2333901

Appendix F: AAUP Approval Letters for Non-Public Hospitals.

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2021-11-30

حضرة د. عدنان قرمش المحترم،

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **احمد " محمد رايق" أحمد أبو صالحة** والذي يحمل الرقم الجامعي 201912952 هو طالب ماجستير في الجامعة العربية الامريكية تخصص معلوماتية صحية، ويعمل على رسالة بعنوان: " **العوامل الأساسية لاعتماد نظام معلومات المستشفى خلال كوفيد -19: دراسة حالة من فلسطين"** تحت اشراف الدكتور محمد مرعب، نأمل من حضرتكم الايعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة، ولتوزيع وتنفيذ استبانة على ادارة المستشفى ورؤساء الاقسام في مستشفى الوكالة- قلقيلية. علماً ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بسرية تامة، وقد أعطي هذه الرسالة بناءً على طلبه.

وتفضلوا بقبول فائق الاحترام،،،

د.شاهيناز نجار

عميد كلية الدراسات العليا

كلية الدراسات العليا
FACULTY OF GRADUATE STUDIES

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E-mail: FGS@aaup.edu ; PGS@aaup.edu Website: www.aaup.edu

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2021-11-30

حضرة السادة إدارة مستشفى H- Clinic المحترمين،

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **احمد " محمد رايق" أحمد أبو صالحة** والذي يحمل الرقم الجامعي 201912952 هو طالب ماجستير في الجامعة العربية الامريكية تخصص معلوماتية صحية، ويعمل على رسالة بعنوان: " **العوامل الأساسية لاعتماد نظام معلومات المستشفى خلال كوفيد -19: دراسة حالة من فلسطين"** تحت اشراف الدكتور محمد مرعب، نأمل من حضرتكم الايعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة، علماً ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بسرية تامة، وقد أعطي هذه الرسالة بناءً على طلبه.

وتفضلوا بقبول فائق الاحترام،،،

د.شاهيناز نجار

عميد كلية الدراسات العليا

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Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2021-11-30

حضرة السادة إدارة مستشفى الأهلي المحترمين،

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **احمد " محمد رايق" أحمد أبو صالحة** والذي يحمل الرقم الجامعي 201912952 هو طالب ماجستير في الجامعة العربية الامريكية تخصص معلوماتية صحية، ويعمل على رسالة بعنوان: " **العوامل الأساسية لاعتماد نظام معلومات المستشفى خلال كوفيد -19: دراسة حالة من فلسطين"** تحت اشراف الدكتور محمد مرعب، نأمل من حضرتكم الايعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة، علماً ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بسرية تامة، وقد أعطي هذه الرسالة بناءً على طلبه.

وتفضلوا بقبول فائق الاحترام،،،

د.شاهيناز نجار

عميد كلية الدراسات العليا

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Arab American University
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الجامعة العربية الأمريكية
كلية الدراسات العليا

2021-11-30

حضرة السادة إدارة مستشفى الزكاة المحترمين،

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **احمد " محمد رايق" أحمد أبو صالحة** والذي يحمل الرقم الجامعي 201912952 هو طالب ماجستير في الجامعة العربية الامريكية تخصص معلوماتية صحية، ويعمل على رسالة بعنوان: " **العوامل الأساسية لاعتماد نظام معلومات المستشفى خلال كوفيد -19: دراسة حالة من فلسطين"** تحت اشراف الدكتور محمد مرعب، نأمل من حضرتكم الايعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة، علماً ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بسرية تامة، وقد أعطي هذه الرسالة بناءً على طلبه.

وتفضلوا بقبول فائق الاحترام،،،

د.شاهيناز نجار

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FACULTY OF GRADUATE STUDIES

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الجامعة العربية الأمريكية
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2021-11-30

حضرة السادة إدارة مستشفى النجاح الوطني الجامعي المحترمين،

تسهيل مهمة بحثية

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وتفضلوا بقبول فائق الاحترام

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Appendix G: AAUP Research Committee for Research and Ethical Principles

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Study title: **" Essential factors for adopting hospital information system during Covid-19 Pandemic: a case study from Palestine"**

Submitted By:

Student's Name: Ahmad Abu Salha

Supervisor: Dr. Mohammad Moreb

Co-advisor: ……...

Date Reviewed:

20 April 2021

Date approved:

29 June 2021

Study titled: "**Essential factors for adopting hospital information system during Covid-19 Pandemic: a case study from Palestine**" was reviewed by AAUP research committee for research and ethical principles and was approved on **29 June 2021**.

Dr. Shahenaz Najjar

Dean of Graduate studies

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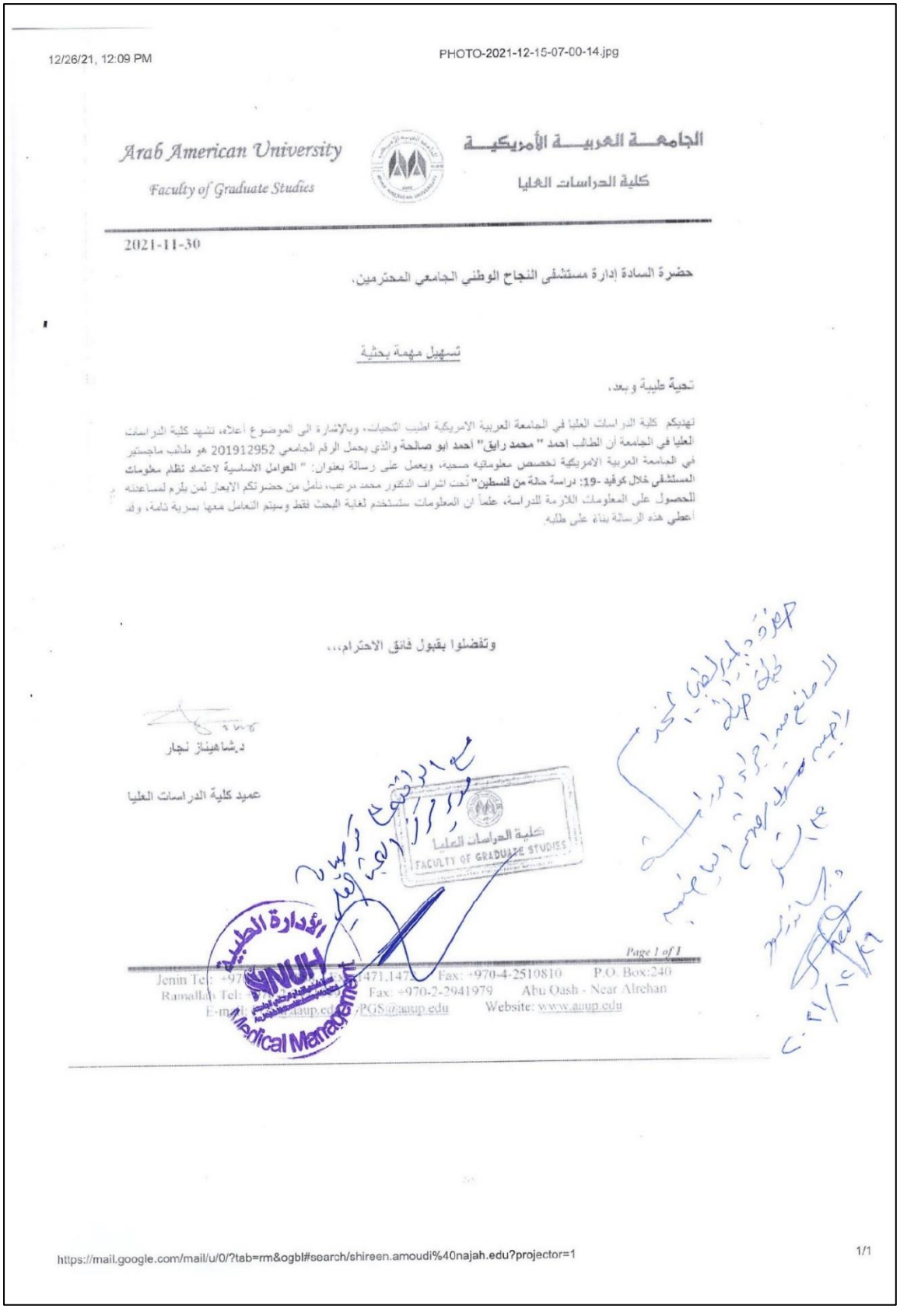
Appendix H: NNUP Approval



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Appendix I: List of the Experts

Name	**Position**
Saleh AbuLafah	Head Nurse – AlAskari Hospital
Fadi Nassar	Supervisor-Rafidia Hospital
Jehad Bani Odeh	Head Nurse – Kashda Hospital

Appendix J: First (F) Part of the Interview with Hospital Manager

In this part the researcher did introduce ten themes

1- **The system used here:**

Table 15 : Hospital Managers -Theme F-1

Codes	Sector	label	Explanation
Using Computerized System, for both sides	Public Hospital	A computerized system, about 95%	We have a Computerized system, about 95% of our information system with Avicenna. but still, we have problems with papers like some documentation paper-like ICU paper, charts, which are still paper. We have CTG for the pregnant woman still paper, ECG and we have for the registration of the newborn,
Using Computerized System, for both sides	Public (COVID- 19 Treatment Centers)	A computerized system, about 95%	still, we depend on paperwork
Using Computerized System, for both sides	Public (COVID- 19 Treatment Centers)	the hospital is full computerized	still, we depend on paperwork
Using Computerized System, for both sides	Public Hospital	we are a Computerized hospital, use HIS	sometimes we use paper
Using Computerized System, for both sides	Public Hospital	have HIS system	Yes, we have HIS system called Avicenna System
Using Computerized System, for both sides	Public Hospital	all hospital departments are computerized, now almost nothing is manual use.	
Using Manual System	Private Hospital	the system here is Mix, Manual files for patients and computerized for financial	Between computerized for accounting and Manual in medical wards papers. * Since our system is Accountant managerial more than Accountant medical.
Using Manual System	NGO Hospital	the system here is Mix, Manual files for patients and computerized for financial	* We use computerize files to account for patient files, * we fill it manually and bring it to computerize.
Using Manual System	Private Hospital	the system here is Mix, Manual files for patients and computerized for financial	Between computerized for accounting and Manual in medical wards papers.
Using Manual System	NGO Hospital	the system here is Mix manual files for patients and computerized for financial	Computerized system and using files, files for patients and computerized for financial issues.

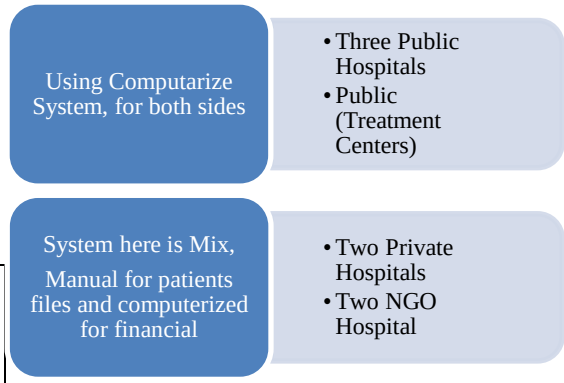

Figure 10: Theme F-1

2- Mix Percentage

Table 16 :Hospital Managers -Theme F-2

Codes	Sector	label	Explanation
95% 5%	Public Hospital	95% computerized and 5% paper	we still have it on paper since we don't have carburation with the internal ministry for registration for newborns. And still, we do not have enough scanners for the inpatient words to scan these papers.
95% 5%	Public (COVID- 19 Treatment Centers)	95% computerized and 5% paper	
	Public (COVID- 19 Treatment Centers)	95% computerized and 5% paper	
	Public Hospital	95% computerized and 5% paper	
95% 5%	Public Hospital	95% computerized and 5% paper	Because we have to do some reports such as outside reports so we can't scan them to the systems since the system doesn't allow us to scan and add files to it. The system doesn't allow us to scan and add files to it.
90% 10%	Public Hospital	It is about 90%	
70% 30%	Private Hospital	70% computerized and 30% paper	About %70 Medical Manual, 30% computerized, in Accountant program: Shamel.
	NGO Hospital		
Mix Percentage 60% 40%	Private Hospital	About 60% computerized, 40 Manual.	We are working in this near month that all HIS be computerized. Within 3-6 months to HIS
	NGO Hospital		

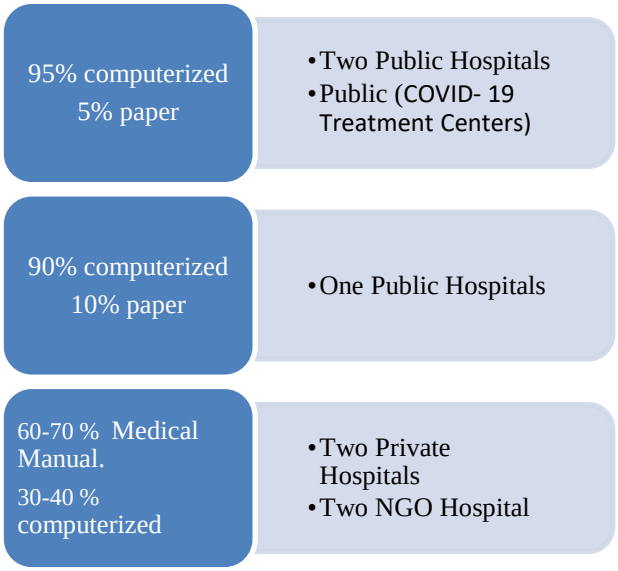

Figure 11: Theme F-2

3- Use of "Note Templates":

Table 17 : Hospital Managers -Theme F-3

Codes	Sector	label	Explanation
Used the templates from the ministry of health	Public Hospital	beginning of the Pandemic	did not use the tent, the sorting tent, we use the system Avicenna system.
Hospitals receive a patient from different hospitals with a confirmed positive Covid-19	Public (COVID- 19 Treatment Centers)	at first, we started writing symptoms and required diagnoses on paper	after administering HIS, we started computerizing symptoms and required diagnosis on the computer.
	Public (COVID- 19 Treatment Centers)	We are using HIS	We are using HIS for Covid-19, especially the Covid-19 center and refer the results to other hospitals.
	Public Hospital	Yes, we screened the patients all the time since the Covid-19 started. We make screening for every suspected patient.	We made a triage area and we screen the patients there, people who deal with this screening Doctors, and nurses. Then write to system.
	Public Hospital	entry form or templates the important issue of this paper written by doctors on paper. After finishing, enter to computer	* When the patient complained from Covid-19 he arrived at the emergency Covid-19 area in front of the hospital we have an entry form or templates for the important issue of this paper written by doctors on paper. Then after we get all results the doctors or nurses recorded the patient admitted to ER on the computer.
	Public Hospital	Used a special form from MOH, for separating suspect, infected, normal, contact cases	There was a special place to separate the infections outside the hospital, not the entrance of the hospital. Did use a special form from MOH, for separating suspect, infected, normal, contact cases by taking needed information for them, and later will be recorded on Avicenna program for each patient admission.
	Private Hospital	No tents we dealt with them only first aid	Then transfer the needed case to hospitals that deal with them. Since our hospital is a small hospital, we did not deal with Covid-19 cases.
	NGO Hospital	Yes, we use it here. after that, we gather all the paper	we gather all the paper, fill it, then we try to analyze it, and make some statistics. Finally, that is manual all the way.
	Private Hospital	we dependent a gradual separating procedure	We had a completely prepared room outside the hospital. Triage patients from here, if the patient is suspect Covid-19 upon the check for him and his answers and asking his relevant, directly Covid-19 tests will be done. Other patients by their check and answers will be sent to ER department then medical wards. The first information from the patient after being taken was sent to MOH centers to gather the needed information.
This was here in our hospital	NGO Hospital	firstly in triage, we collect information and do an Assessment.	in Manually then collect it to send to MOH.

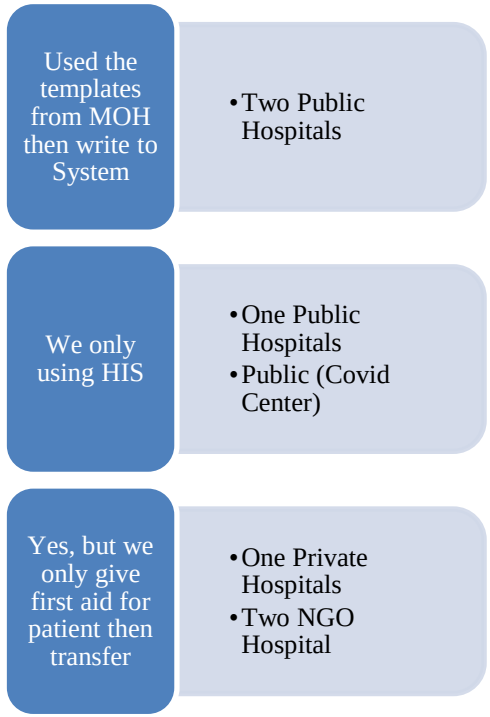

Figure 12: Theme F-3

4- Standards Dependent in facing Covid-19:

Table 18: Hospital Managers -Theme F-4

Codes	Sector	label	Explanation
The standers from the ministry of health (MOH).	Public Hospital	Many cases arrived at Rafidia hospital, suspect and confirmed. First phase: the quarantine hospitals	have many phases, the first when the epidemic started phase2, Covid-19 centers we reported the in the Avicenna system (HIS)
MOH and we use the international standards	Public (COVID-19 Treatment Centers)	Delivered from the Ministry of Health, and we use the international standards of the WHO and NIH standards in the management of Covid-19.	
Use HIS as standard from Ministry of Health MOH	Public (COVID- 19 Treatment Centers)		
For treatment, we used the policies of WHO and CDC	Public Hospital	On the other hand, we collect all the data through the HIS system which we comply with within the hospital.	
deal as policies that send to us from MOH or general directorate of hospitals	Public Hospital		
upon MOH recommendations	Public Hospital		there was a specific place for the separation for the patients, away from the hospital medical wards.
We committed these protocols literally.	Private Hospital	The same standers are dependent on MOH and sent for our hospital.	depending on PPE for safety for patients and employees, also wards and hospital sterilization, and minimizing the patient companions
We don't have treatment or wards for Covid-19 at all.	NGO Hospital		When we reserve the patient, we ask him if he has a fever and do the first check, if have the suspect points we send him to MOH Centers for doing the PCR.
Same standers dependent from MOH and sent for our hospital	Private Hospital		We committed these protocols literally. The communication was telephony, fax, or on the site of the MOH for protocols and medical instructions.
We dealt with the patient with Covid-19.	NGO Hospital	Opened the ward special for Covid-19 cases.	With assistance from MOH to put the standard for Covid-19. We did have almost daily communication with the MOH office in Jenin for new cases and facts. Upon this, an efficient plan was approved from MOH to deal with Covid-19 patients.

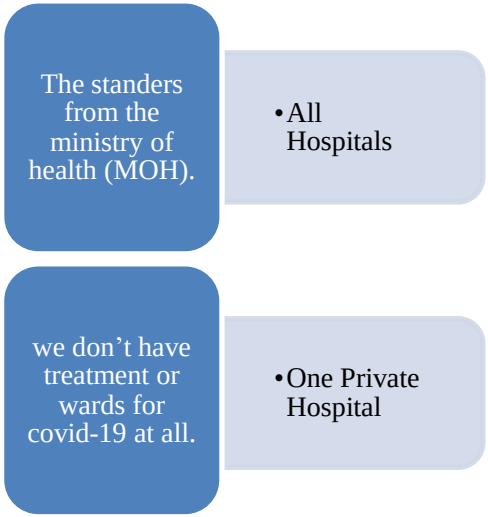

Figure 13: Theme F-4

5- New Hospital and Standards Dependent in facing Covid-19:

Table 19: Hospital Managers -Theme F-5

Codes	Sector	label	Explanation
Reasons for New Hospitals, Opened During the Covid-19, upon demographical data	Public Hospital's	first centers were not enough to fulfill this treatment	upon demographical data of this population and the occupancy rate, Because the first centers were not enough to fulfill this treatment for these patients. So, the ministry of health opened new centers in another population rural area which are far away from the centers
I think it is the general standardized protocol management of Covid-19	Public (COVID- 19 Treatment Centers)		I think only 50% of the hospitals have such a system
Some hospitals don't depend on HIS and depend on paper. We convert it	Public (COVID- 19 Treatment Centers)	We can deal with paper and convert the paper to HIS system	
For new hospitals, they must depend on WHO and CDC policies, the MOH policies, and also HIS system.	Public Hospital		
since no HIS, we face problems in the patient file	Public Hospital	we are facing difficulty when dealing with the patient, because sometimes we have to report that we may lose files when a transfer or restore these manual files.	so we use manual files so we have no computer or HIS in Azon hospital,
they will have to get the computerized data I printed paper for them	Public Hospital		
As a member Government emergency committee:	Private Hospital	Covid-19 patients must be sent to only specific hospitals for treatment.	
WHO put it, and the ministry of health, both.	NGO Hospital	They relied on the standers that WHO put it, and the ministry of health, both.	
New Hospitals and centers that are initialized for Covid-19 patients.	Private Hospital	all belong to the MOH, I do not know about these hospitals and their process in triage or treatment.	
No new hospitals for Covid-19 patients in our Government.	NGO Hospital	* Just every hospital was upon follow up with MOH. * Jenin hospitals were told to open a special medical ward to deal with Covid-19 cases in the Government.	

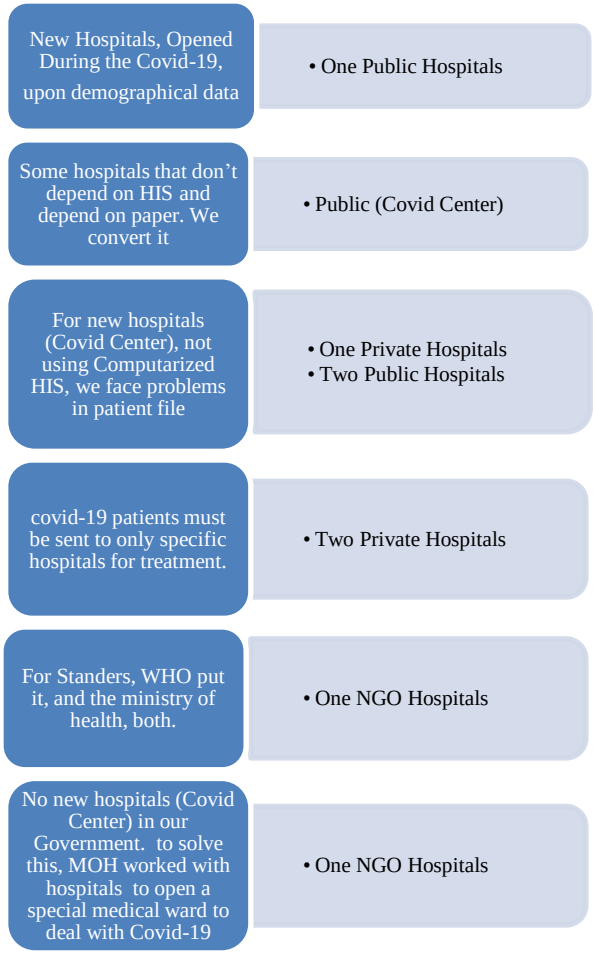

Figure 14: Theme F-5

6- Is New Hospital compatible to Face Covid-19 or not?

Table 20: Hospital Managers -Theme. F-6

Codes	Sector	label	Explanation
Since no computerized system, which was a limitation for us.	Public Hospital	we used to have papers files which was a limitation for us because of the patient we treat.	The data and the medical data. We used to call the doctors in these centers and sent data for them by email or on-call by phone, so it was a problem for us because we cannot send all the patient problems.
Unfortunately, not all hospitals have computerized systems.	Public (COVID- 19 Treatment Centers)		
we convert the paper to HIS system	Public (COVID- 19 Treatment Centers)	convert the paper to HIS system	Some hospitals that depend on paper, Covid-19 center early opened. after that, we convert the paper to HIS system after making patient file to patient file on HIS.
Now some hospitals they established on the HIS system	Public Hospital		
Yes, compatible, but they need to computerize the system	Public Hospital		
The centers opened, only for Covid-19 patients	Public Hospital		Nurses in it were brought from other hospitals, who were working with these cases. When there is HIS system, it did help a lot for dealing with the patients.
I think it is ok for minor cases only	Private Hospital	while other patients who need ICU and oxygen follow up,	we did have leakage in our government. For these cases were sent outside our government.
I think it was doing well using HIS system.	NGO Hospital	In the beginning, they tried to do their best, to achieve the purpose why they lunch these hospitals.	
All belong to the MOH.	Private Hospital	I do not know about these hospitals and their process in triage or treatment.	
	NGO Hospital		

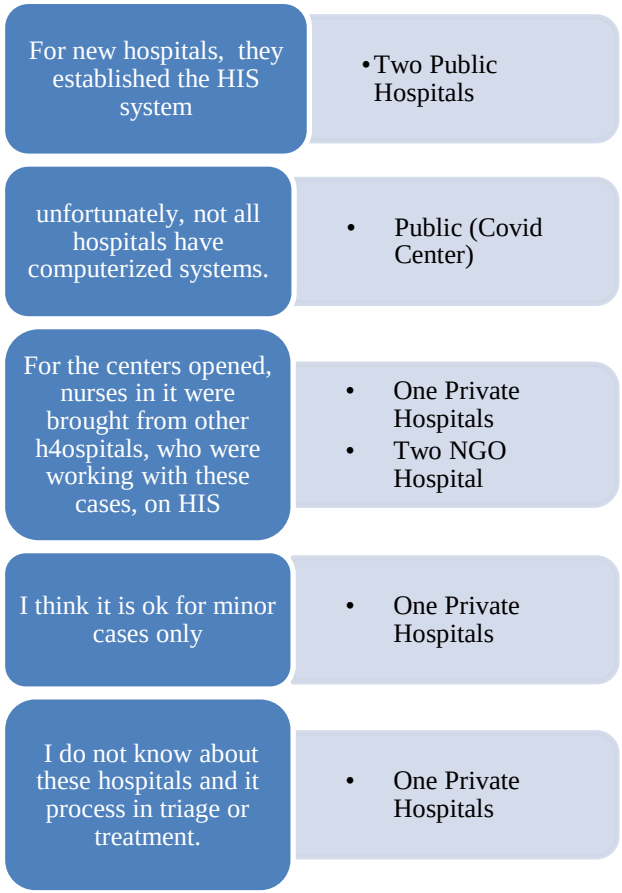

Figure 15: Theme F-6

7- Data Archiving:

Table 21 Hospital Managers -Theme F-7

Codes	Sector	label	Explanation
Because we have the system we do not have a problem with archiving data.	Public Hospital	For the patient, because we use the HIS system.	
in the first period, we used paper	Public (COVID-19 Treatment Centers)	After that, we filled them using simple programs such as MS-Word.	Fortunately, after using Avicenna we could use the system because information can be easily archived and we can go to it any time we need.
It's faster than paper	Public (COVID-19 Treatment Centers)	It's faster than paper while the patient entering all hospital departments	
We developed a new tool and categories with Avicenna	Public Hospital	Which is make us and allow us to gather data smoothly, and quickly then analyze it.	
It is easier and quicker to return any file in a computerized ibn Sina system than paper files.	Public Hospital	I said before 95 % of the information, other information archives in a special area, register room.	
Because we have the system, we do not have a problem with archiving	Public Hospital	Since we have the needed servers in the hospital linked to the central in Ramallah. There was no problem with Archiving.	
The patient medical information is archived manually.	In private Hospitals,	we cannot share patient medical information upon our hospital policy.	
we have a Manual system	NGO Hospital	we have an employee, who is responsible for arranging and doing everything in this section	We are doing well, we use an excel sheet and the number for each patient and the number for the file, according to each year, and retrieve the number any time we want and any information about the patient.
Manual, recording, and gathering all papers and information related to patient visits.	Private Hospital	Take the number on the system and then file sent to the Archive department, to be kept there.	Way: * the whole file will be scanned since the file is taking a number, the paper file will be kept and sorted upon the File Number, and also according to file number will be saved on an Archive department computer. * In this way they can reach the original file or give copies from it scan copy. Using Excel files to save hospital patients' medical files also it is as a pointer for the place where the patient file is kept, in which room, and which shelf.
it is on Excel files.	NGO Hospital	There is a complete department for archiving.	

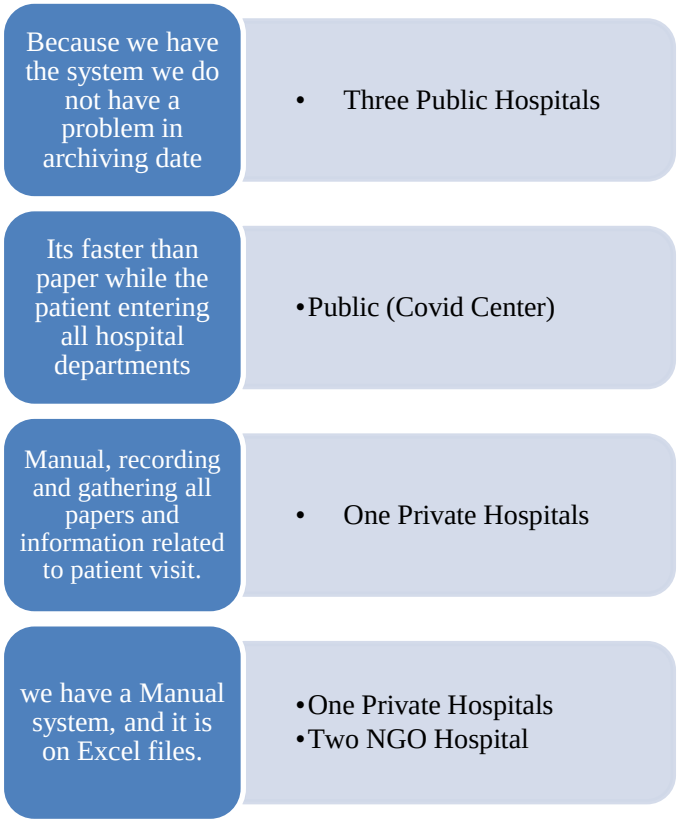

Figure 16: Theme F-7

8- Data Retrieving:

Table 22: Hospital Managers -Theme F-8

Codes	Sector	label	Explanation
Because we use the HIS system.	Public Hospital	Same as archiving the data, we do not have a problem in retrieving	
It is quick when we started using Avicenna	Public (COVID-19 Treatment Centers)	unfortunately, we started having problems with internet speed and lag of the system	Every technical system is solved I think data can be retrieved using Avicenna.
The process is easier and better than using paper	Public (COVID-19 Treatment Centers)	Since we can retrieve from any hospital quickly.	
It was very easy	Public Hospital	For the patient and also, we use reporters and get the information and analyze it and use tools to analyze it. in HIS system	
but Avicenna HIS is very easy and fast	Public Hospital	* About Avicenna HIS it's very easy to retrieve any information or file for the patient's treatment.	* but in manually we face some problems such as we need to go register room or to store to search and explore the file, so it's very difficult process.
Because we use the HIS system.	Public Hospital	like archiving, we do not have a problem in retrieving the data	
No need to retrieve patient information From paper	Private Hospital	for the patient since we need the current status of the patient for treatment.	
I think it is quick, but not enough.	NGO Hospital	Sometimes we need around 30-35 minutes to retrieve the file.	
Same as archiving, upon medical order for the patient file	Private Hospital	Depending on the patient name or ID, will find the patient name in the archive computer on the excel program, then will use the "patient file number" in the hospital, which will direct the employee to the patient manual file place.	
This process is just when patients enter the hospital.	NGO Hospital	after the report is requested from the medical side, this only takes 10-15 min.	this only takes 10-15 min, to bring the needed file from the archive department.

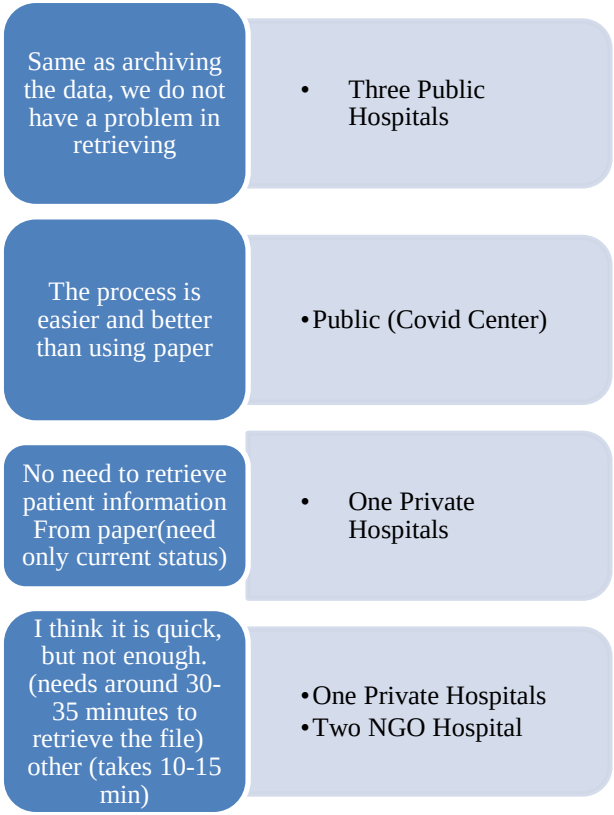

Figure 17: Theme F-8

9- HIS Support Manager Position:

Table 23: Hospital Managers -Theme F-9

Codes	Sector	label	Explanation
All this data and its quality are good. So, use the system daily.	Public Hospital	I can know how many patients, how many staff I will use for these patients	
I think HIS can help our job in making decisions on patients.	Public (COVID- 19 Treatment Centers)	So, it made our job easier, faster, and safer for us and the patient.	we can check the system and imaging from the system before seeing the patient himself, so we benefit from Avicenna and the information stored there, especially the labs, information of the history of the patient, physical examination sign
Being too limited contact with or touch for infected patients. We can check the system.			
Using all monitoring tools to control and follow up.	Public (COVID- 19 Treatment Centers)	use HIS for monitoring the nurse's work	
Avicenna allow us to deal and manage	Public Hospital	Quickly and smoothly.	The occupancy rate, bed management, and also the transfer patients and to manage the PPEs (personal protected equipment)
Using some keys keyboard, it is very nice.	Public Hospital	We support the system	Because when I want to review any point of patient file for Covid-19, I can return to this or review anything in the file very quickly and essay.
HIS is important for management, and the reports from the HIS for follow-up and statistics are needed.	Public Hospital	by following patient files, following wards orders, can get the sum for patients entering the hospital, and upon this, you can decide the patients need	
For sure when you have a HIS, one will be able to see the needed report	Private Hospital		
If we have a HIS system computerized, we will be more accurate, and faster than the manual HIS we have.	NGO Hospital	We hope one day we will do it.	
We use an excel file to enter daily information for patients and wards. For sure when you have a HIS, one will be able to prepare needed reports.	Private Hospital	we use excel file	To enter daily information for patients and wards to be able to yield needed reports last of the month, especially for the operation statistics. This helps to create needed plans, monthly and yearly.
Now, we are depending on manual	NGO Hospital	I do rounds in the medical wards to see the patients and the medical files for them, and from the morning rounds and meetings, we create the needed decisions for the better for the hospital and patients.	* For this we saw that the first period of Covid-19 is not like the second period of Covid-19 or the Third period for this Covid-19. * For our team how learned more and gain more experience and more knowledge about this Covid-19. And this gives a better reflection on the patient's health side. for this, I see that our feedback is better.

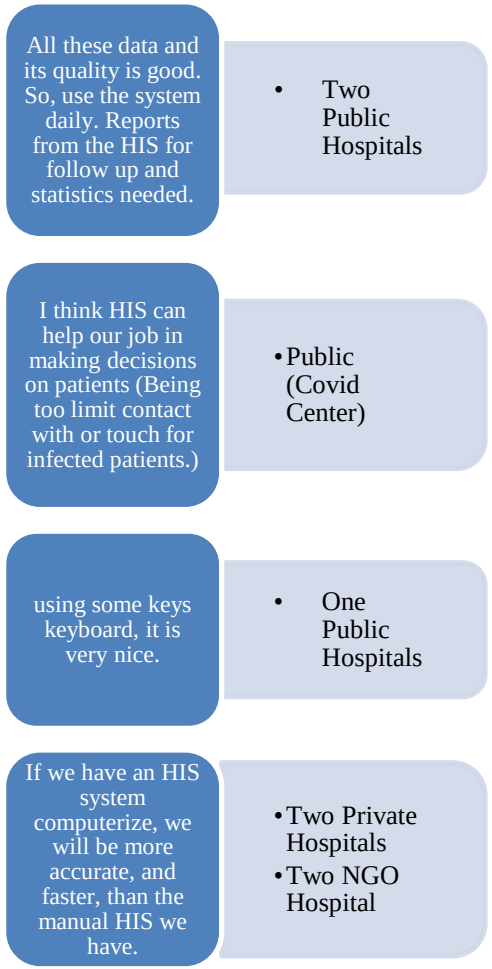

Figure 18: Theme F-9

10- For Your Decisions during Covid-19 pandemic, how you get the feedback:

Table 24: Hospital Managers -Theme F-10

Codes	Sector	label	Explanation
So, we qualify this data, we check it, using HIS system	Public Hospital	used to have to check the information that they entered, the data entered in the system.	sometimes the quality unit work with us and the medical doctor work with us the director medical doctor work with us
feedback using Avicenna is good	Public (COVID- 19 Treatment Centers)	you know, this is a new hospital for Covid-19	* We have technical problems in using Avicenna and connections using new computers you know this is a new hospital for Covid-19. * After knowing and facing these hopefully we fix all the problems and get all the information from the computerized system.
feedback tools of HIS for enhancing and escalating the nurse's performance	Public (COVID-19 Treatment Centers)	using the paper I can't follow the feedback	using paper is not easy evaluating nurse's performance, work, and patients notes
By screening through Avicenna.	Public Hospital	I get feedback from the medical records and also the reporters.	
It's very important to return the computerize system	Public Hospital	It's very important to return the computerized system.	* sometimes like to know how many patients review or how many have complications post corona or post Covid-19, it is very important to know how the team deals with the patient, what is the treatment given to the patient, what is the care of him, all this in manager or management process are very important to introduce the best way to the patient who needs the treatment.
* The reports from the HIS, * analyzing the data from it. * This is important to update the department. * Upon it we prepare the budget for the hospital.	Public Hospital		
* HIS helped us to know what we need.	Private Hospital	Will help us to increase the quality and service quality.	
We did not receive a patient with Covid-19.	NGO Hospital	So, the problem was if we discover it before or not.	When we receive patients who might have Covid-19, we just send them to the centers for diagnostic and doing PCR.
need feedback from 2 sides.: first, the financial side since we are a private hospital. The second part is the patients, as cases and did they benefit from the treatment.	Private Hospital	* Finally, the transfer cases. all were recorded and read to get the feedback points needed for more review.	
the number of Covid-19 patients is not big. But the feedback was good.	NGO Hospital	* the experience gained for our medical team when dealing with cases.	We aspire to have a fully computerized system in the future... and we are working on this.

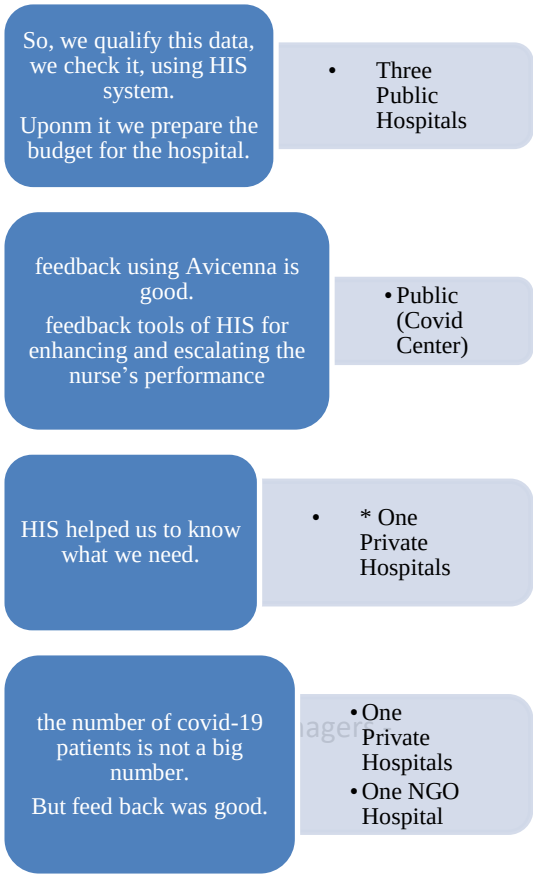

Figure 19: Theme F-10

Appendix K Second(S) Part of the Interview with Computer Experts

- In this part the researcher did introduce seven themes

Continue for previous Appendix J, illustration previously. In this part, the researcher did introduce seven themes. As described below:

1. Infrastructure Update.

Table 25: Computer experts -Theme S-1

Codes	Sector	label	Explanation
No major update in infrastructure	NGO Hospital	No major thing in the infrastructure Only new computers	* We did bring new computers during Covid-19. * Add privileges for departments to use the internet to follow up for Covid-19 cases and connect with MOH
No major update in infrastructure	Public Hospital	No major thing in the infrastructure Only new computers	Yes, we received 10 computers and 3 printers, We choose the departments that have more work.
No Update at all	NGO Hospital	No, we have old infrastructure	Infrastructure for the computers, we have the old infrastructure and depend on our infrastructure such as Internet network computers. About the Covid-19, we communicate with the health minister of health in Palestine that some programs we share between us.
update our data center in our hospital	Private Hospital	No major thing in the infrastructure Only new computers	We were planning to update our data center in our hospital before the Covid-19 pandemic. But it came at the same time with the Covid-19 pandemic. It did affect positively the service provider's time on attitude during the Covid-19.
Yes, for the new hospital	Public (COVID- 19 Treatment Centers)	Yes, for the new hospital Added for new infrastructure for new Departments	* For the new hospital A) There was an infrastructure in the hospital, checked the prior internal network after they gave us the topology plan. B) Added for new infrastructure for new Departments: lab, pharmacy.

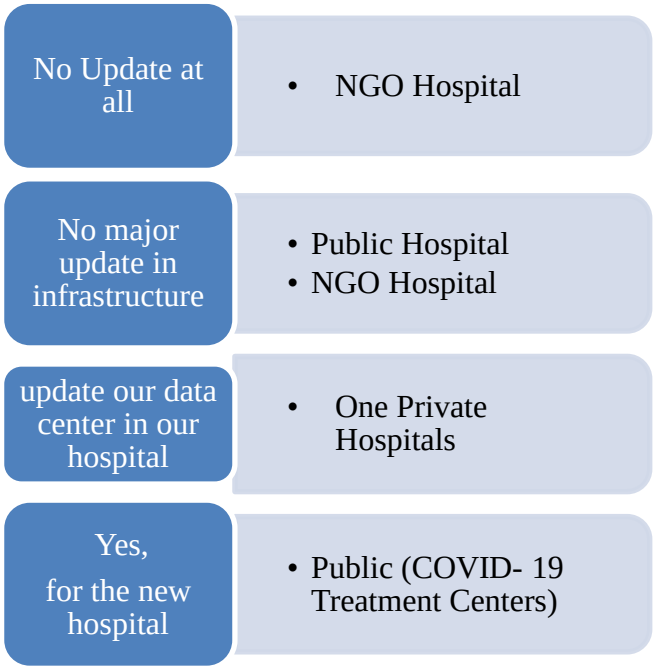

Figure 20: Computer experts -Theme S-1

2. Dealing with numerous data resources and facing the widespread lack of clinical information standards:

Table 26: Computer experst -Theme S-2

Codes	Sector	label	Explanation
Same data storage place, in hospital, we had no problems	NGO Hospital	Data storage place, we had no problems.	But be careful, we changed one HD for a Bigger one, for Backup patients' files on the server.
Operation is done centrally by IT Department	Public Hospital	There is no update for this issue, this operation is done centrally by the IT department	* no one IT staff or management staff notice any problem like that, * because this operation is done centrally by the IT department
Same data storage place, in hospital, we had no problems	NGO Hospital	just one hospital, do not have other hospitals belong to us	All the data we have don't share it with another, where we share it with ourselves only, we keep all the data on storage in the hospital.
In our hospital, we have our system	Private Hospital	* System or not, we work as our internal procedure work normally.	* Our patients: we define patient file and patient ID for him and each visit has its encounter number. * Patient how came from another hospital even if that hospital had HIS computerized system or not, we work as our internal procedure work normally. * If we need to transfer the patient to another hospital, we print out all needed papers for the patients from our HIS system and give them a hard copy to the patient.
First days, was on paper, then connect and work on HIS.	Public (COVID- 19 Treatment Centers)	First days, was on paper, then it was prepared to connect and work on HIS.	* For us, it was difficult, since we have to allot of programs when working in a MOH hospital, such as central Stores use oracle, HIS uses Java, so we dependent to merge these resources

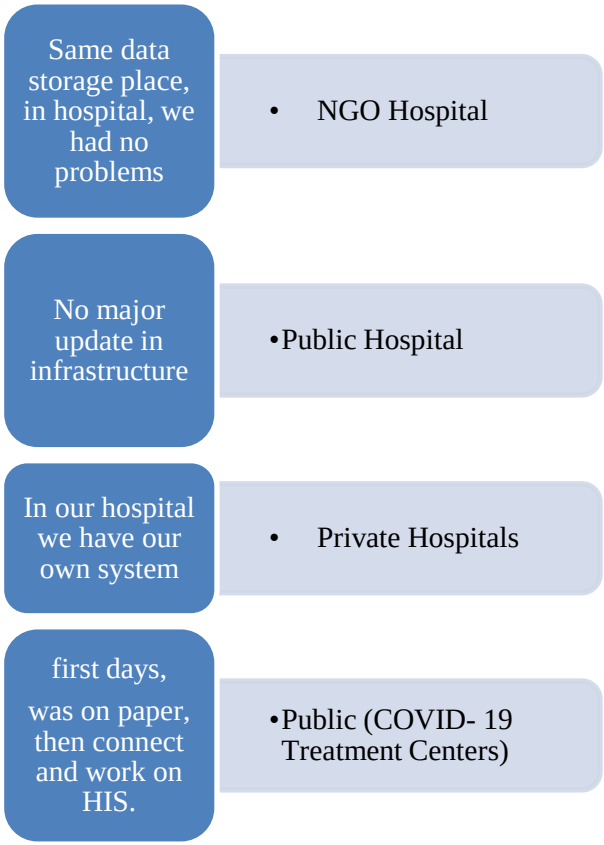

Figure 21: Computer experts -Theme S-2

3. Internal Acceptance and ability for Information Sharing:

Table 27: Computer experts -Theme S-3

Codes	Sector	label	Explanation
No sharing protocols to apply	NGO Hospital	NGO hospitals have no work or sharing information between. Only MOH website.	Using patient ID on the MOH site gives needed information for the hospital about the patient for Covid-19 concern
Sharing protocols are used and applied	Public Hospital	the system builds their history to build the file to be better for a review then.	We built new registration and admissions for these people to give new accounts in Avicenna for those people,
No sharing protocols to apply	NGO Hospital	Government Hospitals solved this, but not with other private or NGOs, Not with us.	Yes, this is a disadvantage of not obtaining all the information... between all hospitals and the Ministry of health
No sharing protocols to apply	Private Hospital	Surely, we repeat any needed test	when we have a patient from another hospital with no official data or no data, from the hospital he came from
Sharing protocols are used and applied	Public (COVID- 19 Treatment Centers)	Working on HIS did help so much in this.	For our work, the Patient medical file is a crucial part.

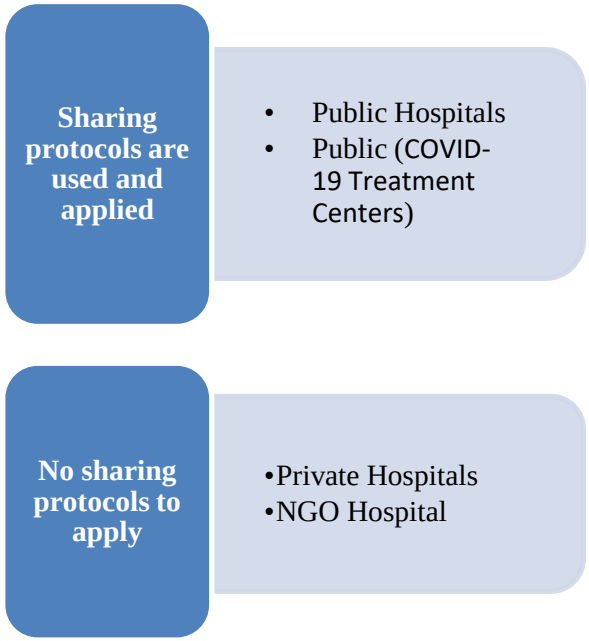

Figure 22: Computer experts -Theme S-3

4. Depending on Health Level 7 (HL7) standard protocol in the hospital:

Table 28: Computer experts -Theme S-4

Codes	Sector	label	Explanation
No, we do not use it, but we have our own system "paper sent ".	NGO Hospital	No, this protocol or program (HL7) is not used in our hospital	* Currently, we use the only manual system in this issue.
Yes, this protocol (HL7) is used in our hospital	Public Hospital	Yes, we use third-party applications and include them in the system.	For example, Avicenna Lab brings information from CBC devices then Avicenna lab forward this information for the Avicenna program.
No, we do not use it, but we have our own system "paper sent ".	NGO Hospital	No, about (HL7) standard protocol, we do not use it, but we have our system.	All results in lab printed by our computers and printers and result sent to medical wards. On paper.
No, we do not use it, but we have our own system "paper sent ".	Private Hospital	No, But the work is under process to integrate all our Lab machines	Until now we do not work as HL7. But the work is under process to integrate all our Lab machines with our computerized HIS system, to be integrated for using protocol HL7.
Yes, this protocol (HL7) is used in our hospital	Public (COVID- 19 Treatment Centers)	Yes, but only CBC.	Finally, all results are sent by computer. But Only the CBC device moves the information using HL7.

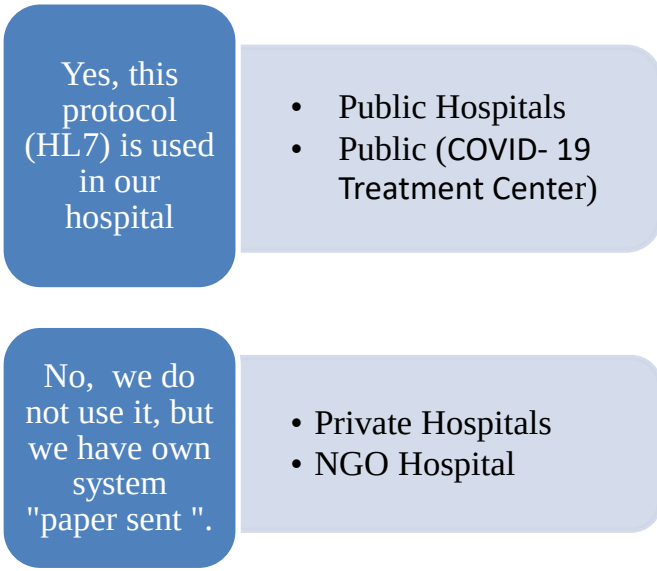

Figure 23: Computer experts -Theme S-4

5. Using HL7 For Covid-19 Patient:

Table 29: Computer experts -Theme S-5

Codes	Sector	label	Explanation
Of course, this is better	NGO Hospital	Of course, this is better, our system prints the paper and sends it to the Wards.	Electrically will be better, especially in these circumstances in Covid-19, Result will be faster, better, more accurate, for time, Test, and Results.
Yes, it is better.	Public Hospital		
we prefer to have another system, this is not the best for a Covid-19related patient	NGO Hospital	We prefer to have another system, to make it easier for the patient.	because it takes to make it easier for patients easier for doctors visit for any work in the definite worker in the hospital.
Yes, it is better,	Private Hospital		Yes, * it is better since it limits the humane error, * it will become faster in service providing
Yes, it is better,	Public (COVID- 19 Treatment Centers)	Surely, this is better for Covid-19 patient	this helped us in the first steps for the hospital.

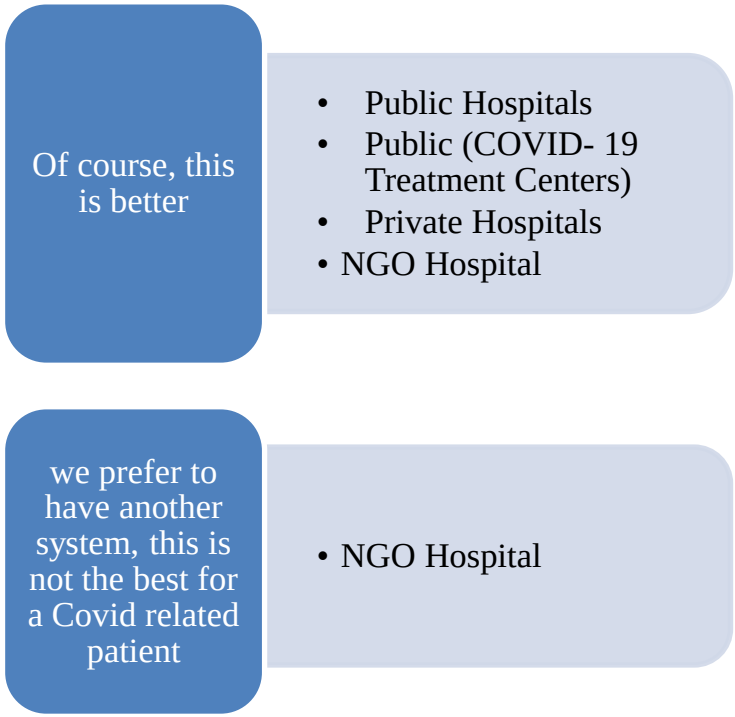

Figure 24: Computer experts -Theme S-5

6. Depending PACS system in the hospital:

Table 30: Computer experts -Theme S-6

Codes	Sector	label	Explanation
Yes, we use this in our hospital.	NGO Hospital		In our hospital, all radiology orders are sent to the Radiology department and replied electrically through the system.
Yes, we use this in our hospital.	Public Hospital	Yes, it is used and there is an integration between them and the Avicenna system.	So, the radiology devices take the photos, those photos are converted to the system then the system goes to the PACS system, and it will be available any ware in Palestine, easily.
Yes, we use this in our hospital.	NGO Hospital	Yes, we use the best system and the best system is a yes is a shared with all computers	
Yes, it is used the PACS system in our radiology department.	Private Hospital	Yes, it is used the PACS system in our radiology department.	
No, PACS here, yet it is not given or working here.	Public (COVID-19 Treatment Centers)	yet it is not given or working here.	For now, we continue asking for preparing and obtaining this feature, to initiate PACS here, yet it is not given or working here. the procedure is not easy since it needs financial support, a yearly license.

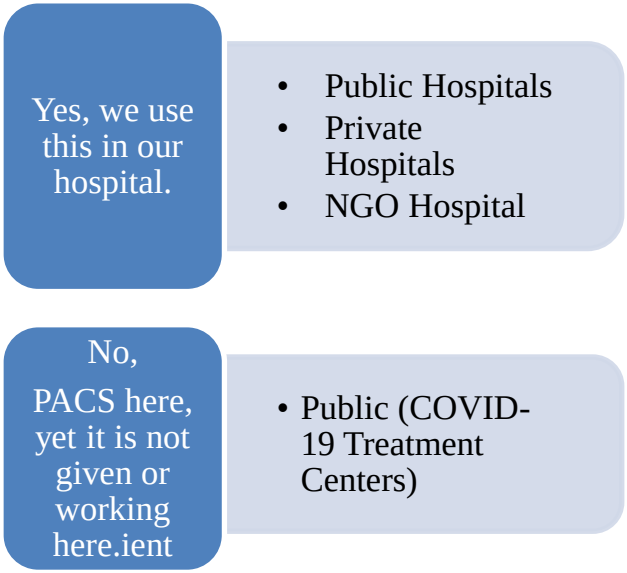

Figure 25: Computer experts -Theme S-6

7. Using PACs system For Covid-19 Patient:

Table 31: Computer experts -Theme S-7

Codes	Sector	label	Explanation
Of course, this is better for Covid-19 patients.	NGO Hospital		On the other side lot of patients from our hospital, come after a period of discharge to ask for their old Rad case and picture. To reply this by Archive department. We did increase the storage space for the Radiology computer
Yes, sourly it is better.	Public Hospital	We did increase the storage space for the Radiology computer	
Yes, it is better.	NGO Hospital		you can see is because it is available what is the distance can't see the image in his zucchini without the way sending a CD or Bieber's on whatever nothing
Yes, it is better.	Private Hospital	Yes, I think it is better, there is no need to wait time until we print out the image	Now at the moment, the image is ready from the radiology department. and the physician can see the image from any were inside or outside the hospital, then write the report, take the needed action for the patient. It Becomes better for all patients specially Covid-19 patients related to their chest x-ray requested by doctors. the physician can see the image from any were inside or outside the hospital.
	Public (COVID- 19 Treatment Centers)		

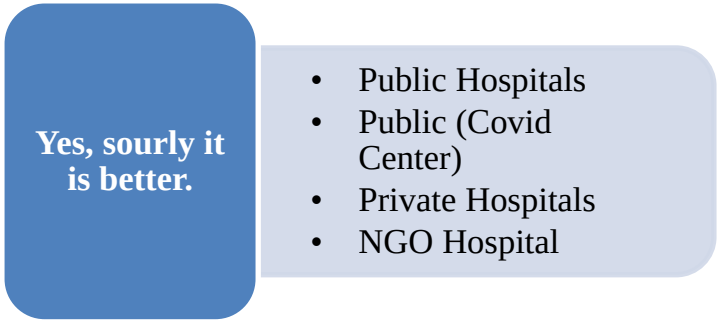

Figure 26: Computer experts -Theme S-7

Appendix L: Contribution

Table 32: Comparison of EFAHIS with the six Frameworks and methodology depending on EFAHIS Covid-19 factors

Factors	EFAHIS Covid-19 A case study in Palestine			Factors supported by other Frameworks and methodology	
	Impact	**P-Value**			
Demographic characteristics of Participants	Do Not Affect	0.384	Not Supported	Support #	Supported ##
Hospital Characteristics	Do Not Affect	0.248	Not Supported	Not Supported ###	Support **
Compatibility	Do Affect	0.011	Supported	Supported *	Supported #
Security & Safety	Do Affect	0.011	Supported	Supported ***	Supported #
Management Support	Do Not Affect	0.072	Not Supported	Supported *	Supported #
Government pressure	Do Affect	0.041	Supported	Supported *	Supported #.
Competitors pressure	Do Affect	0.041	Supported	Supported *	Supported #

*: A case study from Pakistan (Shahzad et al., 2021).
#: TOE and HOT Framework for Malaysian public hospitals(Hossein Ahmadi et al., 2017)
**: Organizational decision to adopt hospital information system: An empirical investigation in the case of Malaysian public hospitals (Sligo et al., 2017)
COVID-19 Pandemic Guidance for the Health Care Sector (Government of Canada, 2020)
***: Factors Affecting the Implementation of Hospital Information System (HIS) Using AHP (H Ahmadi et al., 2014)
###: The moderating effect of hospital size on inter and intra-organizational factors of Hospital Information System adoption (Hossein Ahmadi et al., 2018)

**** والحمد لله رب العالمين ****

ملخص الدراسة

مقدمة

يجب إجراء تحسينات على نظام المعلومات الصحية Health Information System (HIS) للمساعدة في سير العمل وعلاج المريض من خلال إدخال معرفة جديدة للتكيف والتغيير في اتجاه واحد؛ وهذا هو الأفضل للقضايا الصحية. على الرغم من أن فلسطين قد استجابت بسرعة وفعالية لتفشي مرض فيروس كورونا 2019 (كوفيد-19)- Coronavirus Disease 2019 (COVID-19)، إلا أن أنظمة المعلومات الصحية بالمستشفى في التعامل مع مرضى (كوفيد-19) تتطلب المزيد من البحث. هذه هي المرة الأولى، على حد علم الباحث، مثل هذه الدراسة في جميع أنحاء العالم تتعامل مع (كوفيد-19) و نظام المعلومات الصحية(HIS) والمستشفيات معًا لإيجاد حلول مبتكرة لأمراض صحية معينة. الغرض الأساسي من هذا البحث هو استكشاف تصورات مستخدمي نظام المعلومات الصحية (HIS) على العوامل الأساسية التي تؤثر على التبني. كما يهدف إلى تحديث أو ترقية أنظمة المعلومات الصحية (HIS) اثناء جائحة (كوفيد-19) في المستشفيات الحكومية وغير الحكومية. من الأهمية بمكان فهم الأدوات المستخدمة في المستشفيات التي تستخدم نظام المعلومات الصحية (HIS) ، وقبول المرضى و إدارة المستشفيات، والتفاعل مع هذه المنصات المحوسبة لتعزيز علاج المريض والتعامل مع سجل المريض.

طرق الدراسة

غطت هذه الدراسة عشر محافظات وثلاثين مستشفى حكومي وغير حكومي في فلسطين. تم جمع البيانات بطرق مختلطة، كمية (استبيان) ونوعية (مقابلات شبه منظمة). تم استخدام الأداتين للحصول على المعلومات المطلوبة من المديرين المباشرين والموظفين ومديري تكنولوجيا المعلومات. تم استلام عدد (212) استبانة. استخدم الباحث نهج المقطع العرضي في هذه الأطروحة، حيث قام في نفس الوقت بجمع البيانات من العديد من المواقع. كما أجريت المقابلات في الفترة ما بين 2021/11/6 و 2022/1/11. تمت مناقشة الأسئلة النوعية مع 15 مشاركًا. قام الباحث بتحليل وفهم أنظمة المستشفى الفلسطيني لنوعين: أنظمة المعلومات الصحية (HIS) والأنظمة غير الإلكترونية. الاختبارات المستخدمة في التحليل كانت T-test و Anova و P-value (0.05). تم تحليل العوامل الأساسية للعوامل التنظيمية (على سبيل المثال، الدعم من الإدارة العليا) ، والعوامل البيئية (على سبيل المثال، ضغط الحكومة والمنافسين)، وعوامل التكنولوجيا (مثل التوافق والأمن والسلامة) وعلاقتها بتبني نظام المعلومات الصحية(HIS) خلال جائحة (كوفيد-19).

نتائج

بلغ عدد الاستبيانات (211) استبانة تم استلامها من أصل (212) استبانة تم توزيعها. بلغت عينة البحث 30 مستشفى، 29 مستشفى تم زيارتهم (97٪). بناء على جدول 1، تنقسم المستشفيات (نوع المستشفى) إلى 18 مستشفى عام (60٪)، و 6 مستشفيات خاصة (20٪)، و 5 مستشفيات تابعة للمنظمات غير الحكومية (17 ٪). لم تتم زيارة مستشفى واحد (3 ٪). بالنسبة للـ 29 مستشفى التي تمت زيارتها، وبناء على (اسم نظام المعلومات الصحية(HIS))، وجد الباحث أن 15 (52٪) مستشفى تستخدم نظام معلومات الصحة من خلال شراء وزارة الصحة (HIS) ، وأن 6 (21٪) مستشفيات تستخدم" شراء .(HIS)" أخيرًا، تستخدم 8 (28٪) مستشفيات نظام معلومات الصحة "اليدوي".

وجدت الدراسة أن العوامل الأساسية التي أثرت في تبني نظام المعلومات الصحية هي العوامل التنظيمية بقيمة Sig (0.072) ، والعوامل البيئية بقيمة Sig (0.041) ، والعوامل التقنية بقيمة Sig (0.011). تؤثر جميع العوامل على اعتماد (HIS) في مواجهة (كوفيد-19) ، والذي يتم تطبيقه بشكل أفضل في المستشفيات التي تديرها الحكومة .

استنتاج

هذه الدراسة هي الأولى في فلسطين التي تسلط الضوء على الحاجة الملحة لربط جميع المستشفيات ونظام المعلومات الصحية (HIS) معًا للوقوف ضد.(كوفيد-19) بالطريقة نفسها، يساعد ربطهم في تحسين توافق المستشفى مع اعتماد نظام المعلومات الصحية (HIS) واستخدامه ضد (كوفيد-19) ويرفع مستوى تدريب جميع الموظفين في المستشفيات على استخدام نظام المعلومات الصحية (HIS) الكامل لفهم عوامل التكنولوجيا بشكل أفضل. يجب ربط برنامج نظام المعلومات الصحية (HIS) بالخطط الإستراتيجية للحكومة ، والتي ستكون أوامر وزارة الصحة. هذه واحدة من أفضل الطرق لكسب ثقة الناس. وأخيراً يوصي الباحث بإجراء دراسة حول تأثير العوامل الأساسية للمستشفيات على نطاق واسع في فلسطين أو دول أخرى. والجدير بالذكر أن عدد العوامل المذكورة في هذه الدراسة سبعة عوامل.