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Impact of E-Health System Implementation at UNRWA-Gaza Health Centers on Medical Performance and Health Care

أثر تطبيق نظام الصحة المحوسب في مراكز الصحة التابعة لوكالة الغوث (الأنروا) بغزة على الأداء الطبي والرعاية الصحية

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إقـــــرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان:

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بناءً على موافقة شئون البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/ **عماد أحمد عبدالرحمن بدر** لنيل درجة الماجستير في كلية *التجارة*/ قسم إدارة الأعمال وموضوعها:

أثر تطبيق نظام الصحة المحوسب في مراكز الصحة التابعة لوكالة الغوث (الأنروا) بغزة على الأداء الطبي والرعاية الصحية

Impact of E-Health System Implementation at UNRWA Gaza Health Centers on Medical Performance and Health Care

وبعد المناقشة التي تمت اليوم الأربعاء 29 ربيع أول 1437 هـ، الموافق 2016/12/28م الساعة العاشرة صباحاً، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

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وبعد المداولة أوصت اللجنة بمنح الباحث درجة الماجستير في كلية *التجارة*/ قسم إدارة الأعمال.

واللجنة إذ تمنحه هذه الدرجة فإنها توصيه بتقوى الله ولزوم طاعته وأن يسخر علمه في خدمة دينه ووطنه.

والله ولي التوفيق ،،،

نائب الرئيس لشئون البحث العلمي والدراسات العليا

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Abstract

As United Nations Relief and Works Agency (UNRWA) has recently been implementing an in-house built e-health system at its health centers, this study aims to investigate how the implementation of such electronic primary health care system contributes to the enhancement of medical performance and health care at UNRWA-Gaza health centers.

UNRWA has been gradually adopting e-health system which is currently implemented at most of its health centers (19 out of 21 health centers). Population was health centers' staff who are currently making use of the system and who have already developed attitudes toward the system operability and effect on the clinic daily activities and on enhancing staff performance (616 clinical staff), such targeted population include medical staff such as physicians, medical supporting staff such as nurses and administrative staff such as clerks. Researcher followed quantitative approach and target sample utilizing questionnaire tool to survey 320 clinical staff, only 247 usable responses were returned. Researcher used partial least square/structural equation modeling technique to analysis the collected data and test study hypotheses.

Study concluded that information quality of the adopted Health Information System (HIS) has both direct and indirect positive impact on staff performance, only direct positive impact on patient care and only positive indirect impact on physician-patient relationship, while system quality was found to have negative direct impact and positive indirect impact on staff performance and has only indirect positive impact on both physician-patient relationship and patient care.

Noteworthy that HIS has availability, speed, error detection and error prevention issues. It is recommended that these shortfall be addressed together with improving user perception towards ease of use and usefulness of the system. Management should also work to raise confidence in its medical staff to improve the effect of HIS on medical performance and patient care. It is also recommended that UNRWA should implement crowed management techniques such as queuing systems and on-phone booking to minimize patient waiting time.

الملخـص

تهدف هذه الدراسة إلى البحث في مدى مساهمة نظام الصحة المحوسب والذي تم تطبيقه مؤخراً في المراكز الصحية التابعة للأونروا – غزة في تعزيز الأداء الطبي والرعاية الصحية. هذا وقد قامت وكالة الأمم المتحدة لغوث وتشغيل اللاجئين الفلسطينين (الأونروا) مؤخرا بتطوير نظام معلومات صحية محوسب لإدارة مراكزها الصحية بشكل إلكتروني كامل مستغنيةً به كليةً عن النظام الورقي القديم. وقد تم اعتماد هذا النظام تدريجيا في معظم المراكز الصحية التابعة للأنروا حيث تم تطبيقه في 19 من أصل 21 مركزا صحياً في غزة.

مجتمع الدراسة شمل جميع موظفي المراكز الصحية الذين يستخدمون هذا النظام والذين طوروا بالفعل آراء ووجهات نظر حول هذا النظام ومدى تأثيره على الأنشطة اليومية للعيادة وعلى أداء الموظفين. وقد بلغ عدد أفراد مجتمع الدراسة 616 موظف شملوا الأطباء وموظفي الدعم الطبي مثل الممرضات والقابلات والموظفين الإداريين مثل الكتبة.

قام الباحث باتباع المنهج الكمي مستخدمًا أداة الاستبيان لمسح عينة من 320 موظفًا، وقد تمكن من استرداد 247 استبيانًا صالحًا. كما أن الباحث استخدم تقنية partial least square/structural equation modeling لتحليل البيانات التي تم جمعها واختبار فروض الدراسة.

وقد خلصت الدراسة إلى أن جودة المعلومات في النظام المطبق لها تأثير إيجابي مباشر وغير مباشر على أداء الموظفين في المراكز الصحية، كما أن لها تأثير إيجابي مباشر على رعاية المرضى وتأثير إيجابي غير مباشر على العلاقة بين الطبيب والمريض، كما تُبين نتائج الدراسة أن جودة النظام لها تأثير سلبي مباشر وتأثير ايجابي غير مباشر على أداء الموظفين وأن لها تأثير إيجابي غير مباشر على كلٍ من العلاقة بين الطبيب والمريض، وعلى رعاية المرضى.

و جدير بالذكر أن الدراسة خلصت إلى أن نظام الصحة المحوسب لديه مشاكل من حيث السرعة، الإيتاحية (غير متاح دائمًا)، اكتشاف الأخطاء وكذلك منع ارتكاب الأخطاء. وينصح الباحث بضرورة التدخل لتحسين جوانب الضعف المذكورة آنفًا. كذلك يوصي الباحث بضرورة تحسين إدراك المستخدمين بما يتعلق بسهولة استخدام النظام وفوائده الجمة. أيضًا ينبغي للإدارة أن تعمل على زيادة الثقة في الطاقم الطبي من أجل تحسين تأثير النظام على الأداء الطبي ورعاية المرضى. كما يجب على الوكالة استخدام تقنيات جديدة لتخفف الزحام في المراكز الطبية وتقليل وقت انتظار المريض مثل الحجز على الهاتف أو اعتماد نظم محوسبة لإدارة الطابور.

بسم الله الرحمن الرحيم

﴿ وَكَانَ فَضْلُ ٱللَّهِ عَلَيْكَ عَظِيمًا ﴿١١٣﴾ ﴾

[النساء: ١١٣]

Dedication

For my dear dad,

Who endlessly supported me & kept me on foot until

I made it

For my beloved Mom,

Who constantly encouraged me & never gave up

praying

For my wonderful wife,

Who stopped beside me and pushed me ahead with

kindness and devotion

For my darling boys,

For beloved brothers and sisters

I dedicate this study

Acknowledgement

First and foremost, I would like to thank Allah, whose many blessings have made me who I am today. I would like next to thank my thesis advisor Dr. Khalid Abed Dahleez whose office door was always open whenever I ran into a trouble spot or had a question about my research or writing. He consistently allowed this thesis to be my own work, but guided me to the right direction whenever he thought I needed it. Hence I would extend my grateful gratitude and appreciation to him for the valuable guidance and advices.

I would also like to extend my thanks to the experts who voluntarily participated in the process of validating study questionnaire. Without their passionate participation and input, the validation process could not have been successfully conducted. I would also like to dedicate special gratitude to Dr. Khalil Madi and Dr. Mohammed Ghazal whose contribution made rigorous change in my way of thinking.

I would also like to thank Dr. Hisham Madi and Dr. Mohammed Ghazal for accepting to discuss this research and for their valuable comments and advices.

I must also extend big thanks to Health department leaders and staff members at field office and at health centers and special respect and appreciation to Dr. Ghada El-Jadba for the great support and facilitation of the research data gathering.

Finally, I must express my very profound gratitude to my parents and to my spouse for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them.

Thank you all.

Imad Ahmad Bader

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List of Abbreviations

AVE : Average Variance Extracted
BCMA : Bar-Coded Medication Administration
CDSS : Clinical Decision Support Systems
CDSSs : Computerized Decision Support Systems
CMR : Computerized Medical Record
CPOE : Computerized Physician Order Entry
CPR : Computerized Patient Record
CR : Computed Radiography
CT : Computed Tomography
D&M : Delone & McLean
DSS : Decision Support Systems
ECR : Electronic Care Records
EHR : Electronic Health Record
EMR : Electronic Medical Records
EPR : Electronic Patient Record
ESS : Executive Support Systems
FHT : Family Health Team
HIS : Health/Hospital Information System
ICT : Information and Communication Technology
IS : Information System
IT : Information Technologies
LDC : Limited Duration Contracts
LIS : Laboratory Information Systems
MBA : Master of Business Administration
MIS : Management Information System
MRI : Magnetic Resonance Imaging
NCDs : Non-Communicable Diseases
NIS : Nursing Information Systems
NM : Nuclear Medicine
PACS : Picture Archiving and Communication Systems
PHR : Personal Health Record
PI : Performance Indicators
PIS : Pharmacy Information Systems
PLS/SEM : Partial Least Squares/Structural Equation Modeling
PM : Performance Measurement
TAM : Technology Acceptance Model
TPS : Transaction Processing Systems
TTF : Tasks Technology Fit
UNRWA : United Nations Relief and Works Agency for Palestine Refugees
VIF : Variance Inflation Factor
WHO : World Health Organization

Chapter One
Introduction

Chapter One: Introduction

1.1 Introduction

In the contemporary dynamic and swiftly changing environment, information is counted as one of the most crucial factors organizations rely on to create competitive advantages and shape their way to success. Health organizations in particular are repositories for huge amount of sensitive information that directly and indirectly touch human lives and society welfare. Managing such large amount of information and extracting vital parts of them on purpose and on time is such a critical and tough process. Evolution of Information Technology (IT) and the emergence of Information Management Systems (IMS) made life much easier for such organization to better manage information and in turn improve overall organizational and staff performance and enhance health care service delivery. For organizations to sustain distinguishable status in the current strongly competitive market, it is indispensable that they should invest more in IT and stay up to date with the state of art.

In the current challenging environment, Information Systems (IS) have dramatically been attended in health care industry to enhance efficiency and effectiveness of health care facilities (Safdari et al., 2014). IS in health organizations, called health information system (HIS) or simply e-health, have become a priority due to the swift and extensive developments in medical technology and due to the increasing in patients' expectations (Saghaeiannejad-Isfahani, Saeedbakhsh, Jahanbakhsh, & Habibi, 2015). They are used to collect, transmit, display, and store patient data (Salahuddin & Ismail, 2015) and is widely accepted to have the potential to greatly improve quality of patient care, enhance staff performance, and significantly decrease service delivery cost (Aggelidis & Chatzoglou, 2012). Successful implementation of HIS is anticipated to address various problems in service delivery, patient safety, and clinical practice (Cohen, Coleman, & Kangethe, 2016). Patients' administration, hospital financial affairs, and legal affairs are also among the key roles of HISs in hospitals (Maamuom, Satria, Supriyanto, & Yunus, 2013). Health Information System is a socio-technical system that integrates all subsystems in a health care setting and associates human actors in their respective information processing roles (Maamuom et al., 2013). It is also defined as the field that intersects

medical informatics with business by making use of technology (Eysenbach, 2001). There are many different versions of e-health which include, but limited to, hospital information systems (HIS), electronic health record (EHR), computerized physician order entry (CPOE), electronic prescribing (e-prescribing), clinical decision support systems (CDSS), and bar-coded medication administration (BCMA) (Salahuddin & Ismail, 2015). Literature has compiled that many e-health systems were successful and contributed to prosperity and welfare of the organizations where they were implemented (Mair et al., 2012). On the other hand, many other systems failed to achieve their goals and even reduced health facilities' performance (Peikari, Shah, Zakaria, Yasin, & Elhissi, 2015). In spite of the extremely large amount of investment made by organizations in purchasing customizable e-health systems or even building it in-house (Mair et al., 2012), There is no rigorous evidence in literature to assure profitability in return (Aggelidis & Chatzoglou, 2012). Thus, it is crucial that health organizations must investigate whether these systems sufficiently satisfy their operational needs and improves medical performance and health care service (GÜRSEL, ZAYİM, GÜLKESEN, ARİFOĞLU, & Saka, 2014).

This study will focus on how the newly adopted e-health system at UNRWA health centers really influences performance of clinical staff and patient care and advise those who are concerned with the study outcome and recommendations.

1.2 Problem Statement

UNRWA health department started a comprehensive reform effort in 2011; it included two main components: the establishment of the Family Health Team approach and the move to e-Health information system. The initiative was further strengthened by the health department Theory of Change (UNRWA, 2015). The e-Health project is anticipated to reduce staff workload, improve daily operations (data recording and reporting), improve the quality of data, reduce medical errors, reduce paperwork and improve clinical staff capacities and performance. It should also improve the credibility of statistical information (e.g. accuracy, completeness, errors, duplication, etc.) (UNRWA, 2015). According to literature, there are many real successful examples of e-health adoption (Mair et al., 2012) where at the same time,

many researchers highlighted systems that could not make it to achieve their goals (GÜRSEL et al., 2014), on the contrary, they had negatively impacted the health care quality (Peikari et al., 2015) and caused decision makers to lose confidence in these systems (GÜRSEL et al., 2014). Implementation of e-health is such a complex and costly process (Mair et al., 2012) and health institutions invest huge financial capital to implement them (GÜRSEL et al., 2014). Thus, it is crucial that organizations must understand the different dimensions of IS success to ensure return on investment (Aggelidis & Chatzoglou, 2012) and must investigate whether these systems sufficiently meet the requirements and satisfy the needs of users and health care organizations in such a way that would eventually improve medical performance and health care service (GÜRSEL et al., 2014). An interview held between the research and Ms. Taghreed El-Masri, e-health system coordinator and on-job trainer, concluded that UNRWA e-health system is still under development and is not yet materialized as positive and consistent, additionally, it suffers many issues and problems that are reported back to system developers in regular basis for intervention. This has triggered the need for systematic and scientific evaluation of the system.

Hence, this study aims to examine the successful implementation of the health information system currently adopted by 19 UNRWA/Gaza primary care health centers and to explore the extent to which such system impacts job performance of clinical staff, improves physician-patient relationship and enhances patient care. To achieve this goal, the researcher has developed a model by integrating both Delone & McLean IS success model with Technology Acceptance Model (TAM) and altered this integration to point to all of user performance, physician-patient relationship and patient care to answer the main question of the research, namely:

What is the impact of e-health system implementation at UNRWA-Gaza health centers on all of clinical staff performance, physician-patient relationship and patient care?

1.3 Research Questions

Study questions can be divided into two main categories, descriptive questions that describes the attitudes of sample members towards study variables and their evaluating

measures, and analytical questions that addresses the impact of health information system implementation on medical performance and medical care.

1.3.1 Descriptive Questions

RQ1: How did respondents evaluate the quality of the information inserted into or generated from the adopted e-health system?

RQ2: How did respondents evaluate the quality of the adopted e-health system?

RQ3: How did respondents perceive the usefulness of the adopted e-health system?

RQ4: How did respondents perceive the ease of use of the adopted e-health system?

RQ5: How did respondents evaluate their own performance?

RQ6: How did respondents evaluate patient care?

RQ7: How did respondents evaluate the relationship between physicians and their patient?

1.3.2 Analytical Questions

RQ8: To what extent does the information quality directly impact performance of clinicians and indirectly through perceived usefulness and perceived ease of use?

RQ9: To what extent does the System quality directly impact performance of clinicians and indirectly through perceived usefulness and perceived ease of use?

RQ10: To what extent does the information quality directly impact Physician-patient relationship and indirectly through perceived usefulness and perceived ease of use?

RQ11: To what extent does the System quality directly impact Physician-patient relationship and indirectly through perceived usefulness and perceived ease of use?

RQ12: To what extent does the information quality directly impact patient care and indirectly through perceived usefulness and perceived ease of use?

RQ13: To what extent does the System quality directly impact patient care and indirectly through perceived usefulness and perceived ease of use?

1.4 Research Objectives

Based on the above introduction, this study has the following objectives:

1. Identifying attitudes of health center staff regarding the impact of e-health implementation at UNRWA-Gaza health centers on significantly enhancing the overall staff performance.
2. Identifying the attitudes of health center staff regarding the impact of e-health implementation at UNRWA-Gaza health centers on significantly enhancing physician-patient relationship.
3. Identifying the attitudes of health center staff regarding the impact of e-health implementation at UNRWA-Gaza health centers on significantly enhancing overall patient care.
4. Shedding light on the frequency discrepancy of surveyed sample attitudes in regards with questions of the survey attributable to demographic differences such as gender, age, experience and IT background.

1.5 Study Model

To answer the main and sub questions of the research, the researcher adopted and modified the model developed and tested by Ali & Younes (2013) which integrates the perceived components (perceived usefulness and perceived ease of use) of Technology Acceptance Model (TAM) together with D&M IS success model (System Quality and Information Quality) and links them to User performance. The researcher extended this model to include links pointing to patient care and to physician-patient relationship. Many researches inspected the impact of e-health on patient care and on physician-patient relationship but I could not stop at any study investigates individual constructs relationship with neither patient care nor physician-patient relationship, thus the relations studied in this research are considered a new scientific contribution. Figure (1.1): illustrates the final version of the model used by the researcher.

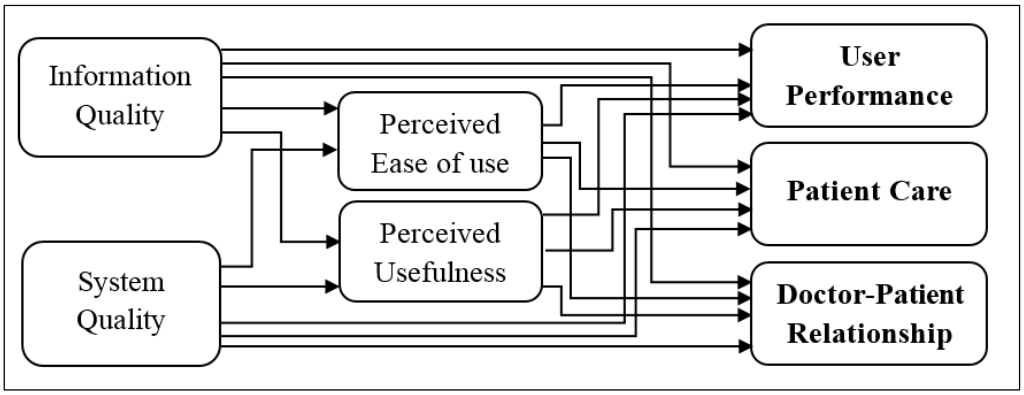


Figure (1.1): Final version of study model
Extension on the model developed and tested by Ali & Younes (2013)

1.6 Study Variables

Table (1.1) categorizes study variables into independent, mediating and dependent variables and elaborates in each of which

Table (1.1): List of independent variables

Independent Variables	
Information Quality	The desirable characteristics of an information system output, or information produced by the system and its usefulness for the user. Information characteristics encompass: Accuracy, Adequacy, Availability, Completeness, Consistency, Format, Relevance, Reliability, Timeliness, Usability, Usefulness and Understandability.
System Quality	Desirable characteristics of an information system that focuses on usability aspects and performance metrics. System Characteristics include: Access, Convenience, Ease of learning, Ease of use, Efficiency, Flexibility, Integration, Interactivity, Navigation, Reliability, Response time, System accuracy and Customizability.

Table (1.2): List of mediation variables

Mediation Variables	
Perceived ease of use	the degree to which a person believes using a particular information system would be free of effort and easy to understand, learn, use manage, manipulate and deal with.
Perceived usefulness	user's subjective beliefs regarding the benefits of using HIS to achieve job goals and enhance performance

Table (1.3): List of dependent variables

Dependent Variables	
User Performance	The accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed
Physician-Patient Relationship	The way physician and patient communicate and interact. The level of mutual respect, knowledge, trust, shared values and perceptions
Patient Care	Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions

1.7 Study Hypotheses

Based on study analytical questions and study objectives, the following hypotheses can be derived:

H1: Information quality of the adopted e-health system has a direct significant impact on clinicians' performance and indirect significant impact through perceived usefulness and perceived ease of use.

H1.a: Information quality of the adopted e-health system has a direct significant impact on clinicians' performance.

H1.b: Information quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived usefulness.

H1.c: Information quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived ease of use.

H2: Information quality of the adopted e-health system has a direct significant impact on physician-patient relationship and indirect significant impact through perceived usefulness and perceived ease of use.

H2.a: Information quality of the adopted e-health system has a direct significant impact on physician-patient relationship.

H2.b: Information quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived usefulness.

H2.c: Information quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived ease of use.

H3: Information quality of the adopted e-health system has a direct significant impact on patient care and indirect significant impact through perceived usefulness and perceived ease of use.

H3.a: Information quality of the adopted e-health system has a direct significant impact on patient care.

H3.b: Information quality of the adopted e-health system has an indirect significant impact on patient care through perceived usefulness.

H3.c: Information quality of the adopted e-health system has an indirect significant impact on patient care through perceived ease of use.

H4: System quality of the adopted e-health system has a direct significant impact on clinicians' performance and indirect significant impact through perceived usefulness and perceived ease of use.

H4.a: System quality of the adopted e-health system has a direct significant impact on clinicians' performance.

H4.b: System quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived usefulness.

H4.c: System quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived ease of use.

H5: System quality of the adopted e-health system has a direct significant impact on physician-patient relationship and indirect significant impact through perceived usefulness and perceived ease of use.

H5.a: System quality of the adopted e-health system has a direct significant impact on physician-patient relationship.

H5.b: System quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived usefulness.

H5.c: System quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived ease of use.

H6: System quality of the adopted e-health system has a direct significant impact on patient care and indirect significant impact through perceived usefulness and perceived ease of use.

H6.a: System quality of the adopted e-health system has a direct significant impact on patient care.

H6.b: System quality of the adopted e-health system has an indirect significant impact on patient care through perceived usefulness.

H6.c: System quality of the adopted e-health system has an indirect significant impact on patient care through perceived ease of use.

1.8 Importance of the Study

UNRWA in all of its operation areas is counted as a fundamental service provider to Palestinian refugees in the fields of education, relief, health, and camp infrastructure. The implementation of an in-house developed computerized health information system in Gaza health centers has the objectives of improving the functionality of clinic workflow, employees' performance level, health care service delivery and reduction of cost. This system is anticipated to positively affect the local community and increase the level of quality of health services for all segments of

refugees. This system is the first in Gaza in terms of its functionality comprehension, integration, and totally replacing paper work.

The importance of this study emerges from the fact that such systems are still new in Gaza and need to be thoroughly studied in order to figure out whether such systems are up to expectations and worth the investment and to identify any significant impact on medical performance and health care attributed to the implementation of such systems.

1.8.1 Importance for the Researcher

Researcher is the technical services officer at UNRWA/GFO and is in charge of the classical e-health servers' administration and leads the technical end-user support unit of all non-scholastic UNRWA/Gaza installation including health centers scattered along the Strip. Referencing the fact that e-health system at UNWA is still under development, researcher aims to better understand the system capabilities and needs and to identify its pros and cons and thereby escalate its weaknesses and vulnerabilities to higher levels and development unit with recommendations. In addition, this research is a mandatory requirement in the Master of Business Administration (MBA) program and is conducted by the researcher to fulfill the requirement of MBA degree.

1.8.2 Importance for Other Researchers

This study can be a vital reference for those interested and involved in the areas of research as most of the previous studies focused on the factors supporting successful implementation of computerized health system but there is hardly any concentrating on its impact on staff and medical performance.

1.8.3 Importance for UNRWA

This study can also be crucial to decision makers at UNRWA and specially health department leaders by pointing out pros and cons of the current system and

shedding light on weak areas that can be treated or improved for better overall service delivery.

1.8.4 Importance for Society

Gaza field office, the largest amongst UNRWA's operation fields, provides primary health care services to more than a million refugees scattered across Gaza Strip through a network of 21 health centers. Improvements applied to the newly adopted e-health program would have crucial effect on the overall quality of the delivered health care service and protect and promote the health of the registered Palestinian refugees.

1.9 Study Limitation and Challenges

This study has the following limitations:

1. **Location Limitation**: this study is limited to UNRWA-Gaza health centers. Health centers in other areas of UNRWA operation such as West Bank, Jordan aren't be included. Similarly, non-UNRWA health centers and hospitals in Gaza are out of the scope of this study.
2. **Human Limitation**: Study population is limited to admin and medical health centers' staff members who make use of the system in their daily operation and who have already developed attitudes toward the system operability and effect on the clinic daily activities (staff members such as cleaners, doorkeepers and clinicians who don't utilize the system are excluded from the population)
3. **Time Limitation**: this study lasted from June-2016 until Dec-2016

It was big challenge for the researcher to disseminate study questionnaire and collect data from the sampled clinical staff as the targeted population is available at 21 health centers scattered at all side of Gaza strip starting from Beit-Hanoun health center in the extreme North to Shoka health center in the extreme south and from Gaza-town health center at the extreme east to Beach health center at the extreme west.

Thereby, it was an extremely exhausting time consuming and costly data collection process.

1.10 Organization of the Thesis

The study consists of six chapters. Chapter 1 contains an introduction, problem statement, study questions and objectives, study model and variables, hypotheses, importance of the study, study limitations and challenges and structure of the thesis. Chapter 2, covers information system conception, health information system, then moves to development of study model followed by elaboration about key factors of successful e-health system. Chapter two ends by introducing UNRWA and UNRWA health system and health reform. Chapter 3 presents previous relevant studies, researches, papers, articles and publications then commenting on them highlighting matching and differences between this study and previous study and sheds light on the benefits grasped from them. Why this study is special follows. Chapter 4 contains research design and methodology, which includes study population and sample, data collection, questionnaire design, piloting, and testing questionnaire for validity and reliability. Chapter 5 contains the data analysis and results, including demographic description of the sample, descriptive analysis answering study questions, data analysis using PLS, and discussing results of hypotheses testing. Finally, Chapter 6 includes the conclusions and the recommendations of the study.

1.11 Chapter Summary

In this chapter the researcher introduced the problem under study, elaborated on the study objectives, questions and hypotheses, three main hypotheses with 19 sub-hypotheses, and explained the various variables handled throughout the study. He also pointed out the importance of the research to the different parties encompassing the researchers himself, other researcher, UNRWA and the society. Study boundaries and challenges were also briefed.

Chapter Two
Theoretical Framework

Chapter Two: Theoretical Framework

2.1 Introduction

Information is a fundamental asset for most if not all organizations and is a key driver to success in a highly competitive environment. Modern organizations show special attention to information management and invest large amounts of capital to acquire information systems that would professionally manipulate different aspects of information management, gathering, storing, retrieving, organizing, and access. Emergence of the new technology enabled easier information provision and manipulation and allowed managers to handle more functions and widen their span of control, at the same time, reduced levels of management hierarchy and enabled companies to flatten. It also allowed decentralization of decision-making without loss of management awareness (Brynjolfsson & Mendelson, 1993). Therefore, investments by firms in information technologies (IT) have increased rapidly over the past three decades (Dos Santos, Peffers, & Mauer, 1993).

Information technology is widely believed to be not only an organizational success factor but also a fundamental survival attribute. Organizations rely on information technology as a competitive advantage for the fact that information systems avail the necessary solid and accurate information to top-management and decision makers to make the right and on-time decisions and to cope the rapid change in the surrounding environment. (Bharadwaj, 2000), consequently, effective and efficient use of IT is a key factor differentiating successful firms from less successful counterparts. For an information system to make sense and worth investment, it has to solve a company's specific problems such as overhead cost of control, production management, or support of customer services (Ragowsky & Somers, 2005).

This chapter discusses the conceptions and definitions in connection with information systems in general and with health information system (HIS) in particular. It also sheds light on the vital role HIS plays in making life easier for all parties and stakeholders of the medical sector. Furthermore, it addresses

some of the theories and models used by researchers in evaluating successful implementation of information systems and in assessing their actual benefits.

2.1.1 The General Concept of Systems

A system, as defined by business-dictionary (2016), is a set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem. Iván Tarride (2006) defined it as a set of parts in interaction which satisfy a certain objective. A wider definition was introduced by Skyttner (1996) who defined the system as a set of interacting units or elements that form an integrated whole intended to perform some function. business-dictionary (2016) defined it in a similar context as an organized, purposeful structure that consists of interrelated and interdependent elements. These elements continually interact and influence one another in order to achieve preset goals of the system. Another rational definition, used especially in the field of management, is that a system is an organized collection of men, machines and materials required to accomplish a specific purpose and tied together by communication links (Skyttner, 1996).

Based on the aforementioned definitions and more, a system can be defined as a group of interrelated components that make up a dynamic and complex "whole" and interact as a structured, functioning unit, within a well-defined boundaries.

In spite of the fact that systems may significantly differ based on type, nature, objectives, internal components, internal and external communication nature, input and output and feedback mechanisms…etc. they all have some common basic properties such as inputs and outputs mechanisms, boundaries, structure, purpose, steady-state…etc.

2.1.2 The Concept of Information Systems:

After defining the general conception of system, it is time to introduce what information system term stands for. Information system is one of the key instruments business managers rely on for achieving operational excellence,

building new products and services, enhancing decision making, and attaining competitive advantage (Laudon & Laudon, 2014). It is defined in business-dictionary (2016) as a combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination, and decision making in an organization. Similarly, Laudon & Laudon (2014) technically defined it as a set of internally communicating parts that process and store gathered data and produce information to support decision making, and other management activities in an organization. It is also anticipated to help managers and workers analyze problems, break down complex subjects, and create new products. Gupta (2000) stated that an information system is any human activities combined with information technology to support operations, management, and decision-making. He also defined it as the interaction between people, algorithmic processes, data and technology. According to Yeo (2002), an information system is a system capable of processing data and generating meaningful information that would support firm's strategy and management plans to enhance the process of decision-making in an organization.

Building on the aforementioned definitions, an information system could be defined as a system that integrates the different interacting parts of Data, hardware, software, personnel and technical activities and carries out a set of processes to satisfy some organizational need, solve an existing problem or achieve preset objectives to improve the overall performance of the organization.

2.1.3 Basic Processes of Information Systems (IS)

Information System is nothing but a set of technology-driven processes developed to respond to variety of needs and problems. It is crucial to most organizations as they cannot survive a competitive environment without a sophisticated information system that would capture events and expose them to a set of value-adding processes. These processes convert captured data into useful and understandable form to support proper and timely decision making (Taylor, 1982). The most essential process in this context are:

1. **Input process**:
    a. *Select*: decide what data must be fed into the system
    b. *Acquire*: gather the selected data from variety of resources within the organization and/or its environment
    c. *Organize*: put gathered data into homogeneous groups based on some criteria such as similar characteristics
    d. *Store*: securely save grouped data into a database for later reclaim and use
2. **Manipulation Processes**:
    a. Retrieve: recall stored data for manipulation and analysis
    b. *Analyze*: process retrieved data by applying mathematical, logical, and comparative operations to produce information that would be useful to system users.
3. **Output Processes:**
    a. Interpret: expand in the generated information and put them in patterns, rules and context to support decision making.
    b. *Display*: show timely graphs and summaries that would assist decision makers take the right decisions.

2.1.4 General Conceptions of Data to Wisdom

Data, information and knowledge are terms used by many people as if they were synonyms. In spite of the fact that people mistakenly use them interchangeably, they are really completely different but interacting with one another. This section of the chapter sheds light on the actual meaning of these different conceptions and put a precise definition for each. According to Ackoff (1989) the content of human mind can be classified into five categories: (Data, Information, Knowledge, Understanding, and Wisdom), more elaborated definitions follow.

1. **Data**: Business-Dictionary (2016) definition of the term is information in raw or unorganized form (such as alphabets, numbers, or symbols) that refer to, or represent, conditions, ideas, or objects. Data is limitless and

present everywhere in the universe. It is also defined as computer symbols or signals that are input, stored, and processed by a computer, for output as usable information. Ackoff (1989) defined data as any form of existing raw that has no significance beyond existence, while Laudon & Laudon (2014) defined it as streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

2. **Information**: defined by business-dictionary (2016) as data that is accurate and timely, specific and organized for a purpose, presented within a context that gives it meaning and relevance, and can lead to an increase in understanding and decrease in uncertainty. Similarly, Laudon & Laudon (2014) defined it as data that have been shaped into a form that is meaningful and useful to human beings. According to Ackoff (1989), information is data that has been given meaning by way of relational connection. To be valuable, information must have several characteristics: It should be *accurate*, *complete*, *economical* to produce, *flexible*, *reliable*, *relevant*, *simple* to understand, *timely*, *verifiable*, *accessible*, and *secure*. The value of information is directly linked to how it helps people achieve their organization's goals (Stair, 2011).
3. **Knowledge**: is expanded by Ackoff (1989) as the appropriate collection of information, such that it is intent to be useful and is usually held in human mind or memory. business-dictionary (2016), however, defines it as human ability resulting from interpreted information; understanding that develops from combination of data, information, experience, and individual interpretation. It is also defined as things that are held to be true in a given context and that drive us to action if there were no hindrances". Laudon & Laudon (2014) believes that Knowledge is a cognitive, even a physiological, event that takes place inside people's heads to transform information into patterns, rules, and contexts. Knowledge residing in the minds is called tacit knowledge, whereas knowledge that has been documented is called explicit knowledge.

4. **Understanding**: According to Ackoff (1989), is a cognitive and analytical process by which man can take knowledge and generate new knowledge from the previously held knowledge. In addition, it is the ability to undertake useful actions based on developed information and knowledge from what is previously known. The difference between understanding and knowledge is the difference between "learning" and "memorizing".
5. **Wisdom**: is defined by Laudon & Laudon (2014) as the collective and individual experience of applying knowledge to solve problems. Wisdom involves where, when, and how to apply knowledge. Ackoff (1989) sees wisdom as the process by which we also differentiate, or judge, between right and wrong, good and bad.

Figure (2.1): illustrates the interrelationship and dependency among the different cognitive terms from data to wisdom.

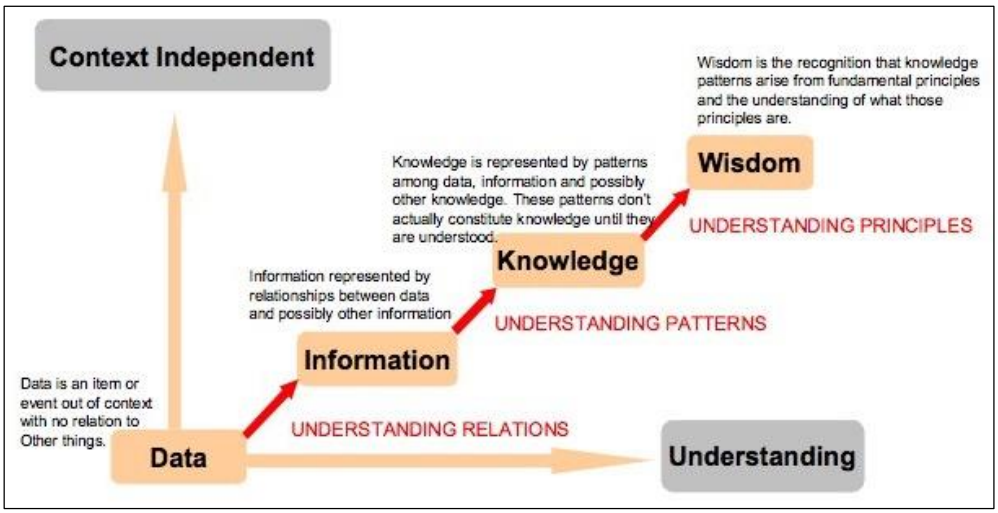


Figure (2.1): Data, information, knowledge, and wisdom.
Source: Bellinger, G., Castro, D., & Mills, A. (2004).

2.2 Health Facilities and Health Information Systems (HIS)

There are several different types of health care facilities that share delivering health care services to patients but differ in size from small single doctor clinics to large hospitals and from outpatient and ambulatory settings to inpatient hospitals and vary in nature of services delivered from medical advices and primary care to secondary and tertiary care and even to surgeries. Likewise, health information systems are designed to fit with service requirements and the role they would play in health care organizations, for example, laboratory information systems would manage work in medical labs and communicate with laboratory machinery to automate analysis processes whilst pharmacy information system would manage pharmacy work and control stock of pharmaceuticals and report on medicine dispensing. The following subsections elaborate more on health facilities and health information systems.

2.2.1 Definitions and Types of Health Facilities

A Health facility is, in general, any location where health care is provided. Health facilities range from small clinics and doctors' offices to urgent care centers and large hospitals with elaborate emergency rooms (MedlinePlus, 2016). Some types of health care facilities are:

1. **Hospital**: is a health care institution providing inpatient treatment with specialized equipment and staff, professional physicians, surgeons, and nurses. Hospitals may have outpatient departments, chronic treatment units, and common support units such as pharmacy, pathology, and radiology. There are several types of hospitals,
    a. ***General hospital*** is often has an emergency department and large numbers of beds for intensive and long-term care (Dhabi, 2016).
    b. ***Specialized hospitals*** include trauma centers, rehabilitation hospitals, children's hospitals, seniors' hospitals, and hospitals for dealing with specific medical needs such as psychiatric problems and certain disease categories (Dhabi, 2016).
    c. ***Teaching hospital*** combines assistance to people with teaching to medical students and nurses (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002).

d. ***Rehabilitation hospitals*** are dedicated to the rehabilitation of patients with various neurological, musculoskeletal, orthopedic and other medical conditions following stabilization of their acute medical issues. These medication settings provide high level of professional therapies such as speech therapy, occupational therapy, and physical therapy. Despite that rehabilitation hospitals can be separate facilities, most inpatient rehabilitation facilities are located within hospitals (Dhabi, 2016).

2. **Clinic**: outpatient clinic or ambulatory care clinic is a health care facility run by one or more general practitioners and focused on delivering health care service to outpatients. It can be public or private property or even part of a large hospital and typically cover the primary health care needs of populations in local communities. There are a variety of specialized clinics such as physical therapy clinics run by physiotherapists and psychology clinics run by clinical psychologists (Dhabi, 2016).
3. **Health care center**: encompasses clinics, doctor's offices, urgent care centers and ambulatory surgery centers, serve as first point of contact with a health professional and provide outpatient medical, nursing, dental, and other types of care services (Dhabi, 2016).
4. **Nursing home**: is a health care facility provides a type of residential care. It is a place of residence for people who require continual nursing care and have significant difficulty coping with the required activities of daily living. Nursing aides and skilled nurses are usually available 24 hours a day (Dhabi, 2016).

2.2.2 Definition of Health Information System (HIS)

The term e-Health is a broad term that refers to everything that applies to the combination of computing or electronic devices and health care or medicine. Thereafter, e-health in the hospital setting could include, electronic patient administration tools and technologies, laboratory information systems, electronic communication systems, etc. while in the primary care setting e-Health may include, Patient records, electronic prescribing, medical records and patient management systems (Botha, Botha, & Herselman, 2014).

There is a set of expressions being interchangeably used by researchers to point out health information systems, not the least of which are E-health, Electronic Health Records (EHR), Electronic Medical Records (EMR), Electronic Care Records (ECR), Electronic Patient Record (EPR), Personal Health Record (PHR) and many others (Nguyen et al., 2014).

Botha et al. (2014) referred to the Health Information System (HIS) as the usage of information and communication technologies (ICT's) in the health domain, to administer treatment of patients, research, health education and the monitoring of public health while Eysenbach (2001) defined it as the field that intersects medical informatics with business by making use of internet and other technologies to deliver enhanced health care service and patient information. It was also defined by Rojas-Mendizabal et al. (2013) as the combined use in the health sector of electronic communication and information technology (digital data transmitted, stored and retrieved electronically) for clinical, educational and administrative purposes, both at the local site and at a distance. Similarly, WHO (2008) defined HIS as a system provides the underpinnings for decision-making and has four key functions: data generation, compilation, analysis and synthesis, and communication and use. According to the World Health Organization (WHO), HIS collects data from the health sector and other relevant sectors, analyzes the data and ensures their overall quality, relevance and timeliness, and converts data into information for health-related decision-making.

Haux (2006) defined HIS as such systems of processing data, information and knowledge in health care environments and called it Hospital information system when the environment is a hospital making hospital information system an instance of the health information system and expanded the latter to mean trans-institutional information system spreading over institutional boundaries in health care (R. Haux, 2004). Moreover, the Hospital Information System was defined by R. Haux (2004) as a system supports the hospital functions of patient treatment with patient admission and discharge, decision support, order entry, clinical documentation and service documentation; handling of patient records, work organization and resource planning; and hospital admission.

In this research, however, e-health is referred to as a paperless computer based information system that runs the daily activities, processes and workflow at primary health care centers; managing and storing patients' records, balancing doctor loads, automating laboratory analyses, tracking pharmacy transactions and stock and generates all kind of reports needed to support tracking health center smooth operability and decision making.

2.2.3 Importance of Health Information System (HIS)

Authorities at all levels of health care, including hospitals, community health centers, outlying clinics and aid posts, as well as ministries or departments of health, are concerned about poor data quality and the impact it has on the quality of health care and the harm it can cause to patients (WHO, 2003). Years back, it has been release by the Institute of Medicine that hundreds of thousands of patients are injured by medical errors and as many as 98,000 die annually as a results (Spath, 2011). In many countries, administrators suffer from poor medical record documentation, large backlogs of medical records waiting to be coded and inconsistent coding, plus poor access to, and utilization of, accurate and accessible patient data. Thus the accuracy and relevance of the information processed are crucial for smooth running of the facility and also in assisting governments with strategic plans and decisions on the provision of health care services locally and nationally (WHO, 2003).

The drastic number of fatalities release by Institute of Medicine and the high need for valid, accurate, accessible patient data together with the vast propagation of information and communication technology (ICT) in business in general and in health care sector in particular provided great opportunities for health information systems to emerge for automating and computerizing health care processes and improving quality and efficiency of the delivered health care service (Rojas-Mendizabal, Serrano-Santoyo, Conte-Galvan, & Gomez-Gonzalez, 2013).

Health information systems (HIS), or alternatively e-health, have transformed the traditional health care systems into more sophisticated, cost-effective, high-value, and high-quality accessible systems (Wickramasinghe, Fadlalla, Geisler, & Schaffer,

2005) that deliver enhanced patient care and avail knowledge bases for medicine and patient records.

There is a very apparent upward trend of high concentration and focus by researchers to study and evaluate the extent up to which e-health can practically be implemented Nguyen, Bellucci, & Nguyen (2014) and integrated successfully at health centers for a more technology-oriented health care service, better service quality, better patients' summaries, reduction of medical errors, enhanced resource management and many other benefits (Buntin, Burke, Hoaglin, & Blumenthal, 2011). Despite the fact that there are real successful examples of e-health adoption, most of the researches contributed to the conception that implementation of e-health is such a complex and costly process (Mair et al., 2012) and that countries diverge much in their speed of adopting e-health, US for example is very slow (Nguyen et al., 2014) and far behind many other industrialized nations such UK and Netherlands (Jha, Doolan, Grandt, Scott, & Bates, 2008) who are counted as leaders in this sector. This slowness can be due to a number of reasons comprising the high cost of implementation, clinicians' resistance and the many other complex challenges facing health care industry which has traditionally been slow to embrace new business techniques and technologies. (Wickramasinghe et al., 2005).

It has been found by Nguyen et al. (2014) that Electronic Health Record (EHR) system has good impacts on the documentation quality, increased administration efficiency, and quality, safety and coordination of health care. Yet, it still has some drawbacks such as high adoption cost, changes to workflow and work disruption.

Health information technology in general and electronic health records (EHRs) in particular are increasingly viewed as tools for improving the quality, safety and efficiency of health systems (Chaudhry et al., 2006; Nguyen et al., 2014) and in turn the well-being of people. Experts consider health information technology a key to improving efficiency, clinicians performance and quality of health care (Chaudhry et al., 2006).

From the above, the researcher can conclude that although many countries are still slow in adopting e-health system and despite its drawbacks, most of the researches ensured by evidence that implementation of e-health system has its apparent

contribution toward better quality of delivered health care service and better overall clinical performance.

2.2.4 Types of Health Information Systems

There are many different types of health information systems that facilitate different operations and activities at health organizations, these systems are usually named based on the service they provide. Examples of such medical systems are:

Electronic Health Records (EHR): is a standalone system or a central component of an integrated health information system where patient data in digital form are stored and exchanged securely by multiple authorized users (Häyrinen, Saranto, & Nykänen, 2008). Such system allows digital input, storage, display, retrieval, printing, and sharing of information contained in patients' health records (Black et al., 2011). In addition EHR preserves patient histories and details of recent care and may incorporate digital images and scanned documents. EHR may also include nonclinical data relevant to health care administration and/or planning such as bed management and commissioning data (Black et al., 2011). Similarly, CMS.gov website (Centers for Medicare and Medicaid Services) defined EHR as an electronic version of a patient's medical history, that is maintained by the provider over time, and may include all of the key administrative clinical data relevant to that persons care under a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates access to information and has the potential to streamline the clinician's workflow. The EHR also has the ability to support other care-related activities directly or indirectly through various interfaces, including evidence-based decision support, quality management, and outcomes reporting (CMS.gov, 2012). Some versions of EHR encompass: electronic medical record (EMR), electronic patient record (EPR), computerized patient record (CPR), computerized medical record (CMR), Personal health record (entered and controlled by the patient), digital medical record (web-based record maintained by a health care provider) (Häyrinen et al., 2008).

Picture Archiving and Communication Systems (PACS): are clinical information systems used to acquire, transmit, store, and display image information. Besides acquiring images directly from digital modalities such as computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine (NM) and computed radiography (CR), these systems use laser digitizers to convert images on radiographic film to digital images. The images stored in PACS can be reproduced either on film with a laser camera or be displayed using a high resolution television monitor (Arenson, 1992; Choplin, Boehme 2nd, & Maynard, 1992). PACS Provides accessibility, image quality, search-ability, transportation, sharing, and preservation of medical images. In addition, it improves the organizational efficiency, including time and cost savings, continuity of care, and ability to remotely view images (Black et al., 2011).

Computerized Provider (or Physician) Order Entry (CPOE): such systems are typically used by clinicians to enter, modify, review, and communicate orders (Campbell, Sittig, Ash, Guappone, & Dykstra, 2006); and return results for laboratory tests, radiological images, and referrals (Black et al., 2011). These systems not only integrate orders with patient data and PACS images, but they also have the explicit purpose of electronic transfer of orders and the return of results. The electronic request of orders and return of results is expected to result in organizational efficiency gains and time savings (Black et al., 2011).

E-Prescribing: refers to clinical information systems that are used by clinicians to enter, modify, review, and output or communicate medication prescriptions. Such systems can integrate or interface with EHRs or be an element of a broader CPOE system (Black et al., 2011). E-prescribing systems support electronic transfer between the prescriber and the pharmacy and often encompass five different functions: computerized prescribing associated with clinical decision support, pharmacy benefit eligibility checking, formulary compliance, and medication history reporting, followed by prescription routing to a retail pharmacy or mail order pharmacy (Halamka et al., 2006). E-Prescribing systems should result in benefits, including improvements in

organizational efficiency and practitioner performance in relation to prescribing. Furthermore, these system have the potential of reducing prescribing errors leading to better medications and improved patient outcomes (Black et al., 2011).

Pharmacy Information Systems (PIS): are designed to meet the needs of pharmacy departments and to enable pharmacists to supervise and control medication use in health facilities. PIS employ variety of activities to support pharmacy smooth daily operations. One of these activities is ***Clinical Screening***: monitors drug interactions, drug allergies and other possible medication-related complications. ***Prescription Management*** is another activity that manages prescriptions and check for availability of pharmaceutical products and dispense drugs accordingly. Prints out prescription labels and instructions on how medication should be taken and tracks all prescriptions' transactions and keep transaction logs. ***Inventory Management*** activity aids inventory management by maintaining an internal inventory of all pharmaceutical products, providing alerts when the quantities go below a preset threshold and recommends ordering to cover shortages. One other activity is ***Patient Drug Profiles*** that manages patient profiles that contain details of their current and past medications, known allergies and physiological parameters. another activity is ***Report Generation*** that generates reports about Utilization: determining medication usage patterns in the hospital, Workload: showing the volume of transactions performed within a specified time period, and Financial reports: providing the cost of drugs purchased and/or dispensed to patients, and assisting in preparing annual budgets (Biomedical-Informatics, 2006; Troiano, 1999).

Laboratory Information Systems (LIS): manage laboratory information for all the laboratory disciplines such as clinical chemistry, hematology and microbiology. They provide modules for sending tests to laboratory instruments, track those tests and capture and report the results. These generated reports can then be communicated to other systems such as patient's electronic medical record or billing system (Biomedical-Informatics, 2006; Troiano, 1999).

Nursing information systems (NIS): computer systems that manage clinical data from a variety of health care environments, and make data available in a timely and orderly fashion to aid nurses in improving patient care. NIS help improving workload functionality, staffing levels and appropriate skill mix per shift which would reduce time spent in designing and amending rosters as well as time spent in care planning, while at the same time the quality of what patients' recorded are improved. This in turn results on complete care plans and more complete assessments and evaluations. Electronically prescribed drugs are more legible, thus making it less likely that drugs would be wrongly administered to patients (Biomedical-Informatics, 2006; Troiano, 1999).

Computerized Decision Support Systems (CDSSs): clinical information systems that integrate clinical and demographic patient information to provide support for decision making by clinicians. These systems have highly variable levels of sophistication and configurability with regards to inputs such as patient data, knowledge bases, suggestion mechanisms, and outputs. The main anticipated impact of CDSSs is the improvement of clinical decision making. This improvement should, in turn, lead to improvement in practitioner performance in a variety of care activities such as provision of preventive care, diagnosis, and disease management and ways in which these care activities are delivered. These systems should also be able to help address inconsistencies in care by facilitating standardization, especially when integrated in one of the other systems, EHR, PACS, CPOE, or e-Prescribing system (Black et al., 2011).

2.2.5 Objectives of E-Health System

Eysenbach (2001) introduced ideas and meanings to the e in e-health that reflected the actual purpose of why e-health system should exist and what all is about. He agreed that e in e-health stands for electronic, which also was emphasized by Botha et al. (2014) who defined e-health as a broad term refers to everything that applies to the combination of computing or electronic devices and health care or medicine. Yet,

Eysenbach offered 10 other possible meaning e which would identify the different gaps in current health care service and pose the importance of new e-health system.

The first objective of e-health is to increase ***efficiency*** in health care, and to decrease costs by, for instance, avoiding duplicative interventions and unnecessary diagnosis. The second objective is to ***enhance quality*** of care by following quality standards and allowing comparisons between different providers. The third objective is to avoid assumed interventions and to rely on ***evidence based*** intervention, effectiveness and efficiency of health care interventions needs to be proven by rigorous scientific evaluation. The fourth objective is the ***empowerment*** of consumers and patients by making the knowledge bases of medicine and personal electronic records accessible to consumers over the Internet, which would enhance patient-centered medicine, and enable evidence-based patient choice. ***Encouragement*** for true partnership between the patient and health professional, where decisions are made in a shared manner is the fifth objective. The sixth one is enhancing health-***education*** for both physicians and patients through online sources and tailored preventive information directed to consumers. One more objective is ***enabling*** information exchange and communication in a standardized way between health care facilities. The eighth objective is globalization-related, ***extending*** the scope of health care to cross both geographical and conceptual boundaries and enabling consumers to easily obtain health services online from global providers. The ninth objective is to maintain ***ethics*** by adhering to law and ethical consideration such as security, privacy and equity issues and the last objective is ***equity*** which is anticipated to be achieved by successful implementation of e-health which will avail heath information to rural and urban populations, rich and poor, young and old, male and female, etc.

2.2.6 Benefits of Health Information Systems

The high trend toward adopting e-health systems in the public and private sectors resulted in improved health care service and higher quality of life. The huge dissemination of medical information on the internet and the easy-to-reach online knowledge-bases of medicine, together with the accessibility of personal electronic records over internet have increased health awareness, enhanced patient-centered medicine and reduced medication problems. This, of course, impacted Life expectancy and caused the median age of population to grow and in turn changing demographics of countries (British-Columbia,

2009). Moreover, health information systems have many other desirable evident-based benefits reported by a number of researchers. Wire-Business (2011) for example listed 10 benefits health facilities may gain for implementing computer-based health information systems:

1. Facilitates informed based decision making and improves quality of care.
2. Introduces remote consultations that is anticipated to save patient lives.
3. Makes health care service more efficient and effective and less costly.
4. Facilitate earlier - and more accurate - diagnoses.
5. Simplifies access to a patient's history record, limits the negative impact of drug interactions or poor response to treatment plans.
6. Simplifies and enhances coordination and raises administrative efficiency.
7. Facilitates expert diagnosis to rural residents through remote treatment.
8. Video technology introduces prompt and less expensive treatment and decreases transfer rates and medical costs.
9. Wireless devices can also support real-time treatment.
10. Telemedicine and remote in-home monitoring assist much in enhancing senior wellness and preventative care.

Similarly, Botha et al. (2014) believes that successful implementation of e-health is anticipated to save cost and improve both efficiency and effectiveness of both health care facilities and clinicians. It is also expected to improve health safety and reduce medical errors via standardizing health care, improving diagnosis processes and enhancing self-managing chronic diseases. Safer drug dispensing and preventive health care support are also potential results of e-health adoption. Botha also stated that such adoption of e-health would enhance decision making, improve quality assurance for forecasting and improve communication and management for enriched workflow efficiency, less paperwork and more employee and patient satisfaction. Customer medical awareness should also be enhanced through sharing of information and accessibility of online medical knowledge-bases. E-health would also make patients' lives easier and safer by allowing remote health care and remote accessibility to physicians. In addition, the Ministry of Health, Health Authorities, Regional Health Districts and all public bodies governing health will all benefit from e-health (British-Columbia, 2009) through:

1. Faster delivered, reliable, accurate and consistent information.
2. Increased efficiency and reform through better information availability.
3. Health services planned, managed and delivered in concert with patient needs.
4. Savings via duplication elimination and health care directed at patient needs.
5. Sustainable health care delivery by extending specialist services and skills.

2.2.7 Challenges of E-Health Adoption

A growing number of researchers are focusing on the advantages and strengths of computer-based health information systems, interactive health communications, and online technology and encouraging medical institutions to implement and fully utilize e-health systems, yet none of the researchers declines the existence of a variety of challenges that hinder successful implementation of e-health (Atkinson & Gold, 2002). Some of these challenges are elaborated below:

1. **High Cost**: One of the major challenges of having e-health implemented is the high cost of e-health implementation. The high cost of system development, hardware and infrastructure cost, staff training cost and cost of technology used make the transfer from traditional to computerized health care an expensive move (Atkinson & Gold, 2002; Botha et al., 2014).
2. **Lack of Expertise**: Another challenge is the lack of expertise. Medical specialists are usually technically poor and at the same time technology experts have very little medical knowledge. System developers must have both technical and medical skills to produce sophisticated and comprehensive easy to use systems that would attract clinicians and satisfy business needs (Atkinson & Gold, 2002).
3. **Resistance to Change:** Implementation of new information systems are usually accompanied with process change or process reengineering and organizational restructuring. This big change in the daily routine and roles of staff is a direct cause for clinicians' resistance to change (Botha et al., 2014).
4. **Quality of Data Entry**: Feeding the new e-health systems with patients' data is a very big concern. In the cut-over period, all paper-based patient records have to converted into electronic version and be injected into the system. The

challenge at this stage resides on the quality of data collected and inserted. Data entry errors due to misspelling of data, missing some data element, typo, Inconsistent definitions and data formats due to absence of standardization and lack of data quality assessments and many others degrade quality of converted data and in turn cause serious complications and consequences on diagnosis and treatment process (Botha et al., 2014; WHO, 2003).

5. **Confidentiality and Data Protection**: Patient information security, data protection and patient privacy are considered big challenge. Although e-health systems are usually secure and allow access only to authorized practitioners, patients are still concerned about their sensitive data being shared or published online especially when many information tracking tools and curious intrusive individuals are attached to the internet phishing privacy and stealing others' information (Atkinson & Gold, 2002).
6. **Complexity of Design and Interoperability**: E-health system can also be very complex to design and develop especially when it is perceived to work in many settings with a broad range of different consumers and providers. Some serious diseases need collaborative efforts between a variety of health experts who work on different health facilities and need to have timely access to accurate health information records to effectively coordinate care (Kreps & Neuhauser, 2010). All these concerns and many others such as scalability of the system, usability and fit to business needs make decision makers think twice before stepping into to adopt e-health systems.

2.2.8 Security and Confidentiality of Health Information Systems

In the world of open systems and intensive interaction with external surroundings, there is always high concerns that security vulnerabilities could pose a significant risk to business in general and private data repositories in particular. More specifically, the chances of security breaches increase in direct proportion to the degree of connectivity with the outer environment (Lake, Milito, Morrow, & Vargheese, 2014). The rapid development in health care sector and the introduction of computer-based health care systems, health care networks that span over multi-health care

facilities, remote medication and health care over internet together with the introduction of wireless communication means, handheld medication and telemedicine applications triggered high need for patient data protection to avoid both intentional and unintentional abuse of information (Atkinson & Gold, 2002). Moreover, the increasing demand on accessing patient data by various users such as health care staff, researchers, government agencies, and insurance companies has made it indispensable to preserve privacy and confidentiality of such data exchange transactions against unauthorized malicious modification and to ensure data dependability (Li, Lou, & Ren, 2010).

Confidentiality, privacy and security are three important and related concepts that are often used interchangeably when talking about health information security, yet each of which has its own fundamental meaning and unique role (McWay, 2015):

Confidentiality: the obligation of health care providers to maintain patient information in a manner that will not permit dissemination beyond the health care provider.

Privacy: the right of the individual client or patient to be let alone and to make decisions about how his/her personal information is shared.

Security: refers directly to protection, and to the means used to protect the privacy of health information and support professionals in holding that information in confidence.

2.3 Development of Study Model

Implementation of information systems in general and health information systems in particular have been facing challenges for more than three decades. In spite of the tremendous progress in methodologies and theories, these challenges are still questionable by many recent scholars (Delone & McLean, 2003). In addition, development of information systems is such an expensive process and require large investments (Safdari et al., 2014). Therefore, managers' and stockholders' major concern, when they consider making an investment in information systems, is whether this investment will add to the performance of their organization (Ragowsky & Somers, 2005). It is

dramatically essential that organizations must understand the different dimensions of information system success to ensure return on investment through improved efficiency, effectiveness and performance of the organization (Aggelidis & Chatzoglou, 2012). Due to the existence of different information system stakeholders (managers, users, beneficiaries and system designers) with each stakeholder has his own criteria for success, a comprehensive model covering all aspects of success became highly needed (Safdari et al., 2014). DeLone and McLean reviewed the existing definitions of IS success and their corresponding measures and suggested that information system success is measured through several interacting factors comprising system quality, information quality, the way information in the system is used, the degree of system users' satisfaction, and the overall effect of those systems on users and organizations (Ragowsky & Somers, 2005). They also classified the measures into six major interrelated and interdependent categories. These dimensions: system quality, information quality, service quality, intention to use, user satisfaction, and net benefits, were integrated into a comprehensive framework that quickly became one of the dominant evaluation frameworks in IS research (Delone & McLean, 2003). The Technology Acceptance theory (TAM) proposed by Davis (1989) in his Doctoral thesis is also one of the most common theories widely used by scholars to explain IS usage. The original version of the model experienced many amendments by researchers and sometimes get integrated with other models to satisfy study requirements (Surendran, 2012). Figure (2.2), illustrates the original model proposed by Davis (1989).

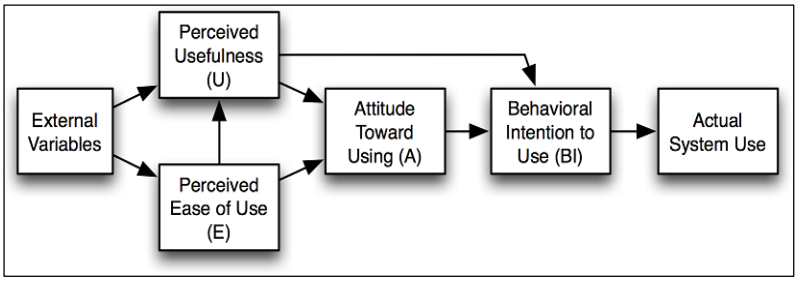


Figure (2.2): Technology Acceptance Model (TAM)
Source: Surendran, P. (2012)

On this model, *Perceived Usefulness* and the *Perceived Ease of Use* are the two major elements that affect IT acceptance and end user satisfaction and determine the actual use of the system (Maamuom et al., 2013). These two constructs are impacted by external variable that could be social, cultural and political factors (Surendran, 2012). In IS applications, system and information characteristics are considered the influencing external variables.

Tasks Technology Fit (TTF) model is another well-known theory in information systems used to addresses the relationship among IS, task requirements and user needs. It was built upon the conception that users, tasks and IS characteristics must sufficiently integrate well to achieve high level of system usability and high overall user performance (Ali & Younes, 2013).

In his study titled "The Impact of Information Systems on user Performance - An Exploratory Study", Ali & Younes (2013) had developed, tested and validated a model that integrates all of D&M and TAM and Task Technology Fit models. He used the proposed model to investigate the impact of information quality, system quality and task technology fit on end user performance. He also inspected if TAM perceived factors have any mediation effect on this impact. Figure (2.3) illustrates the proposed integrated model studied by (Ali & Younes, 2013).

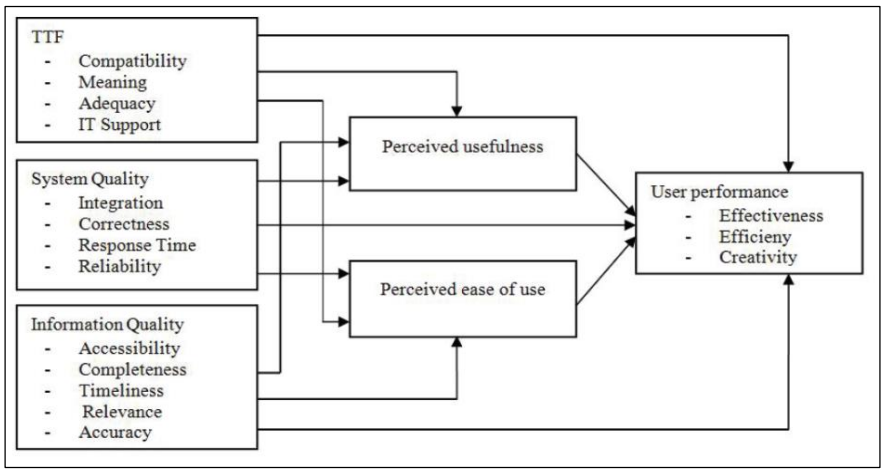


Figure (2.3): The Impact of Information Systems on user Performance

Source: Ali, B. M., & Younes, B. (2013)

For this study, the research would rely on Ali & Younes' proposed and validated model as a ground to stand on in studying the impact of the subject e-health system on medical performance and health care. However, the system is not a generic software purchased by UNRWA with customization to fit with UNRWA's style of clinical operations. On the contrary, it has been developed in-house as a special purpose software and was made up to satisfy clinicians' needs and to fit with the way UNRWA runs tasks and daily activities at health centers. The system is not yet mature and is being amended day by day to get it best fit work and most satisfy health centers' staff members. For this particular reason, the researcher has assumed task technology fit and has omitted it from the proposed model.

Reviewing literature and previous studies lead the researcher to stop at doctor-patient relationship as another construct anticipated to be influenced by the utilization of e-health systems. Type and order of the questions asked by physicians to their patient have become, to a large extent, system driven and are greatly affected by what information are in the system and how this information is organized (Patel, Arocha, & Kushniruk, 2002). Furthermore, screen gaze found to negatively impact orienting statements (transition statements, instructions, and directions) and to interrupt eye contact between the two parties (Margalit, Roter, Dunevant, Larson, & Reis, 2006). It is also sensitive that patients understand physicians' decision-making process in order to facilitate effective and safe doctor-patient communication, especially in remote medication. Several studies showed negative impact on doctor-patient communication while other studies that addressed patient portals and other online tools emphasized the enhancement of patient medical awareness and thereby easier and improved doctor-patient communication (Ammenwerth, Schnell-Inderst, & Hoerbst, 2012). The much of controversy in literature regarding the real benefits of HIS in influencing such relationship and the high recommendation by scholars that this construct should be investigated more together with the high importance of such relationship, lead the researcher to have this construct included in the study model.

For the impact of e-health implementation on patient care, however, Ammenwerth et al. (2012) conducted a systematic review seeking an evidence

on the impact of electronic patient portals on patient care and focused on six dimensions: impact on clinical outcome, impact on health resource consumption, impact on patient adherence, impact on patient-physician communication, impact on patient empowerment, and impact on patient satisfaction but could not conclude any statistically significant effect on any of the six dimensions. Similarly, Likourezos et al. (2004) studied clinicians' satisfaction with EMR and concluded that although clinicians are generally satisfied, they insisted that the EMR has no positive impact on patient care. On the other hand, Marshall & Chin (1998) reported in his study titled "The Effects of an Electronic Medical Record on Patient Care" that clinicians perceive the benefits of EMR and the role it plays in improving patient care and physician-patient interaction thus further inspection on how e-health impacts patient care is needed to better understand the real benefits of e-health adoption. Therefore, the researcher has amended the model to include patient care factor as well. The final version of the study model is illustrated in Figure (1.1).

2.4. Key Factors of Successful e-Health Systems

This study addresses information quality, system quality, perceived usefulness and perceived ease of use as success factors of e-health system and investigates their direct and indirect influence on user performance, doctor-patient relationship and impact on patient care.

2.4.1 Information Quality

Delone & McLean (2003) defined Information Quality as the desirable characteristics of an information system output, or information produced by the system and its usefulness for the user. Information characteristics encompass the following antecedents: Timeliness, Format, Accuracy, Usefulness, Adequacy, Conciseness, Scope, Uniqueness, Precision, Consistency, Usability, Understandability, Availability, Completeness, Reliability, and Relevance. Cohen et al. (2016) believe that information quality is important predictors of end-user satisfaction and productivity outcomes and defines it as the content

and format of the system's outputs so as to ensure they are usable, sufficiently detailed, meaningful, easy to read and understand, and therefore helpful for task completion and decision making. Similarly, Häyrinen et al. (2008), expanded on Information quality to measure both the output and input of the information system and among its many aspects Completeness and Accuracy dimension were the most typically used to measure information quality.

Information generated from patient interactions with health care providers must have value to support both physicians' and management decisions. Such information is valuable when it is accurate, relevant, structured and presented in an easily useable form. Correct and up-to-date information is critical, not only for the provision of high-quality clinical care, but also for continuing health care, maintaining health care at an optimal level, clinical and health service research, and planning and management of health systems (WHO, 2003). Absence of high quality information seriously impact the quality of decision making, thus if the output of the information system does not meet quality standards, decision-making will suffer (Laudon & Laudon, 2014).

2.4.1.1 Main dimensions of information quality

Main dimensions of information quality as declared by Laudon & Laudon (2014) and WHO (2003) are accuracy, reliability, completeness, legibility, timeliness, accessibility, integrity, consistency, and validity. Hereunder is a brief description of each.

1. **Accuracy**: information are correct, representing reality and related to the same patient
2. **Reliability**: data is consistent on repeated collection, processing, storing and display of information.
3. **Completeness**: all required data are present.
4. **Legibility**: patient data are stored in a clear and readable format.
5. **Timeliness**: data are immediately entered into the system as events occur and are available whenever needed.
6. **Accessibility**: all necessary data are reachable, understandable, and usable when needed for patient care.

7. **Integrity**: the structure of data and relationships among the entities and attributes are consistent.
8. **Consistency**: using unified conventions and data definitions across system modules, data amendments and updates are reflected everywhere in the system.
9. **Validity**: data values fall within defined ranges.

2.4.1.2 Benefits of High Quality Patient Information

High quality patient information has many benefits, some of which were listed by World Health Organization, in its publication titled "*Improving Data Quality, A Guide For Developing Countries*" (WHO, 2003):

1. Availing accurate and complete personal health records for better future care diagnosis and medical intervention.
2. Strong and confident information supporting management for better decision making.
3. Medico-legal supportive tool used to resolve medico-legal disputes.
4. Maintaining history about diseases treated and treatment procedures.
5. Tracking immunization and screening programs, including the number and type of participants.
6. Input for clinical and health service research and outcomes of health care intervention.
7. Accurate, reliable and complete statistical information about the uses of health care services within a community.
8. Source for health care professionals for lessons learnt.
9. Working out staffing requirements and planning health care services.

2.4.2 System Quality

System quality is defined by Delone & McLean (2003) as the desirable characteristics of an information system that focuses on usability aspects and performance metrics. Cohen et al. (2016) defined it differently as the user's

experience of the system from a technical, design and operational perspective. This experience is noticeable in the user's evaluation of the system attributes such as *ease of use*, *reliability* and *response time*. Häyrinen et al. (2008) referred to system quality as an information system success factor that assesses the information processing system itself, and its attributes including ease of use, ease of learning and usefulness of the system. Ali & Younes (2013) focused on Reliability, Correctness, Response time, and Integration to measure system quality and endorsed that a high level of system quality can provide users with convenience, more privacy and quicker responses. Delone & McLean (2003) reviewed literature and stopped at many additional measures that have been proposed and used to capture the system quality construct as a whole. These measures are: *Access, Convenience, Customization, Data accuracy, Data currency, Ease of learning, Ease of use, Efficiency, Flexibility, Integration, Interactivity, Navigation, Reliability, Response time, Sophistication, System accuracy, System features, and Turnaround time*. Amongst all listed attributes, *responsiveness* and *easy to learn* were found to have the highest impact on user satisfaction (Cohen et al., 2016).

System quality and information quality have direct impact on user performance and indirect influence through perceived usefulness and perceived ease of use (Ali & Younes, 2013), system quality has also been found to have a positive association with net benefits, even though most of the effect is moderated through system use and user satisfaction (Delone & McLean, 2003).

2.4.3 Perceived Usefulness

One of the main factors proposed by Technology Acceptance Model (TAM) that predicts users' behavioral intention towards using new technologies and in our context using health information systems is Perceived Usefulness (Davis, 1989). Such factor can lead to better attitudes about the information system, along with higher acceptance and usage of the system in an organization (Stair, 2011). perceived usefulness is dependent on how much features of the information system fit with user and job's needs and expectations (GÜRSEL et

al., 2014). Therefore, Perceive Usefulness is defined as the user's subjective beliefs regarding the benefits of using HIS to achieve job goals and enhance performance within a medical practice (Maamuom et al., 2013). It also refers to whether the system provides accurate, timely, relevant, reliable and valid information for users and is regarded for the individual impacts such as improving individual productivity and user performance which in turn would enhance the overall job performance (Ali & Younes, 2013). This means that people tend to use or not use information systems up to the extent they believe it will help them perform their jobs better or enhance their job performance (Davis, 1989).

All of information quality, system quality, service quality, human characteristic, and organizational characteristic are factors influencing end user's perceived usefulness (Maamuom et al., 2013). Although human and organizational characteristic are very crucial factors affecting user intention toward using information systems, Maamuom et al. (2013) believes that focus should much more be on quality factors because quality factors evaluate the outcome of the system itself instead of users' subjective perceptions. Furthermore, both information quality and system quality have strong positive relationship with perceived usefulness as when quality aspects increase, perceived usefulness increases as well (Ali & Younes, 2013). Dansky et al. (1999) in their study of physician perceptions and EHR acceptance factors in ambulatory care found that perceived usefulness has the strongest positive influence on physicians' attitudes toward EHR system usage (Morton & Wiedenbeck, 2010). Similarly, perceived usefulness in Gagnon et al. (2014) study explained a significant proportion of behavioral intention to use EHR and this finding was found consistent with most prior researches.

In general, promotions, incentives, and other rewards reinforce employees for good performance and this means that high level of perceived usefulness of a system has a positive user-performance relationship (Ong & Lai, 2006). Ali & Younes (2013) approved this direct relationship in his study titled "*The Impact of Information Systems on user Performance*" and complemented that perceived

usefulness mediates the relationship among D&M quality aspects and user-performance.

2.4.4 Perceived Ease of Use

The second main factor proposed by Technology Acceptance Model (TAM) is Perceived Ease of Use (Davis, 1989). The term ease means freedom from difficulty or great effort, and in this sense perceived ease of use would refer to the degree to which a person believes using a particular information system would be free of effort (Davis, 1989). It also refers to the extent to which a user believes using a particular system would be easy to manage, manipulate and deal with or the degree to which a system is considered easy to understand, learn and use (Ali & Younes, 2013).

Perceived ease of use is found by many researcher to have significant positive effect on user behavior and user intention to use information systems and end user performance. Gagnon et al. (2014) conducted an empirical study to identify the main determinants of physician acceptance of EHR in the Province of Quebec (Canada) and concluded that TAM perceived constructs could explain a significant proportion of the behavioral intention to use the system. Furthermore, Perceived ease of use was found to influence not only physicians' intention to use EHR, but also their perceived usefulness as well (Gagnon et al., 2014). Thus, when perceived ease of use in some system implementation is identified as a problem, perceived usefulness is relatively lowered as a result (Tsiknakis & Kouroubali, 2009). Absence of fit between system users and the provided technology found to dramatically affect users' perceived ease of use of the system. Hence system design features have significant positive effect on the perceived ease of use when these features fit user's expectation (Gagnon et al., 2014). Khajouei et al. (2010) stated that the positive impression of ease of using Computerized Physician Order Entry System (CPOE) by doctors, grasped from system features, interface consistency and system error prevention, affects their efficiency and medication safety due to the reduction of doctors' mental and cognitive loads which leads to better

concentration and less medical errors (Peikari, Zakaria, Yasin, Shah, & Elhissi, 2013).

Perceived ease of use is also found to be one very common measure of system quality (Urbach & Müller, 2012). The results of Ali & Younes (2013) study showed that the more users perceive information system ease of use the more they will have positive effects on user performance. In addition, Ali & Younes (2013) concluded, with evidence, that not only perceived ease of use has direct positive effect on user performance but also mediates the impact of information quality, system quality, service quality, and task technology fit on end user performance.

2.4.5 Staff Performance

Nature of health care organizations and the sensitivity of the service delivered to beneficiaries made health care staff and clinicians' performance a big concern. Duties of health care staff are critical to the day-to-day welfare of people and must be served professionally and naturally (Richman, Riordan, Reiss, Pyles, & Bailey, 1988). In spite of the fact that few people enjoy the process of being evaluated and may experience anxiety and feesl sick as the annual performance review approaches, successful organization regularly execute performance appraisals to identify vulnerabilities and mitigate performance issues (Dunning, 2014). The rationale of performance appraisal is not limited to identifying problems but also to providing opportunities for staff members to enhance their skills through developmental experience, to empower them and to provide the support needed to deliver high quality service (Chow, Lo, Sha, & Hong, 2006). therefore, and with the high propagation of technology, organizations invest much of capital to computerize, reengineer and restructure their activities and processes throughout the adoption of information systems at the potential of increasing effectiveness and efficiency of the organization and improving the overall performance of both firms and individuals (Ali & Younes, 2013).

2.4.5.1 Definition of Performance

Performance is defined in business-dictionary (2016) as the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed. It is also defined by Yu, Hamid, Ijab, & Soo (2009) as the prospective likelihood to carry out particular actions in order to successfully achieve set of goals within the given time frame and constraints of the stakeholder and the situation. One other definition of performance is the actual results achieved compared to the desired results (Yu et al., 2009). Similarly, Smith, Mossialos, & Papanicolas (2008) defined it as the extent to which various aspects of the system meet their key objectives. Armstrong (2006) defined performance as the achievement of quantified objectives resulted from appropriate behavior and the effective use of the required knowledge, skills and competencies. Performance should be defined as the outcomes of work because they provide the strongest linkage to the strategic goals of the organisation, customer satisfaction, and economic contributions (Shaikh, 2014). From the above definitions, it is very apparent that performance means the extent to which desirable results were actually achieved.

2.4.5.2 Definition of Performance Measurement (PM)

According to Bourne et al. (2007) There is a significant diversity among researchers in defining Performance Measurement, each defines it from different perspectives, depending on three main combinations: *features* of PM, *roles* PM plays and *processes* comprise PM. Bourne et al. (2007) perceives performance measurement as a set of metrics used to quantify both the efficiency and effectiveness of actions. He also perceives it as the reporting process that gives feedback to employees on the outcome of actions. On the other hand, it is literally defined by Yu et al. (2009) as a tool measuring the achievements of an individual, group or an organization by using statistical evidence such as financial data, market share to validate meeting preset objectives. System performance measurement inspects the extent to which the different facets of the system meet their strategic objectives. Usually, those objectives comprise a limited number of headings such as efficiency of service delivery,

responsiveness to public preferences, the financial protection and its productivity (Smith et al., 2008).

2.4.5.3 Performance Indicators (PI)

Performance indicators are tools to assess the extent to which objectives and standards of performance have been achieved (Armstrong, 2006). Besides being accepted, understood and owned across the organization (Chan & Chan, 2004), they must satisfy a number of criteria, such as validity, reproducibility, acceptability, feasibility, reliability, and sensitivity in order to maintain effective and consistent performance measurement (Smith et al., 2008; WHO, 2008). Paying attention to these technical considerations, policy-makers should pay careful attention to the political and organizational context within which performance data are to be collected and disseminated (Smith et al., 2008; WHO, 2008).

The process of developing performance indicators involved the consideration of the following guidelines (Chan & Chan, 2004).

1. PI should be kept general and focused on critical aspects of outputs or outcomes.
2. Number of PI should be kept limited and manageable for regular use. Having too many or too complex PI can be time and resource consuming.
3. Use of PI has to be systematic and consistent over a number of periods or tasks.
4. Data collection must be made as simple as possible.
5. Graphic displays of PI need to be simple in design, easy to update and accessible.
6. PI is subject to change and refinement.

2.4.6 Doctor-Patient Relationship

The profound evolution of technology in health care sector has intensively influenced the doctor-patient relationship, such relationship is crucial for physicians to identify the illness and prescribe effective medication plan and for patients to understand the nature and consequences of the disease, to participate in the treatment decision and to adhere to the doctor advice (Aziz, Nordin, Noor, & Isa, 2014).

E-health systems seriously affected the way how physicians interact with patients and made face to face communication less common especially at the emergence of biometric & telemedicine devices, and consumer-focused wireless and wired internet applications (Weiner, 2012). Several studies showed that patient portals and other online tools made medical records accessible to patients and increased patient medical conscious and thereby improved doctor-patient communication, yet several other studies showed patients' concerns about confidentiality and understandability of the content (Ammenwerth et al., 2012). In-line with the latter study, Margalit et al. (2006) examined the relationships between the extent of electronic medical record use and physician–patient communication in some primary care setting affiliated with Technion School of Medicine in Haifa. The study concluded that using computers in the examination room limits physician–patient dialogue due to screen gaze, particularly in the psychosocial and emotional realm, and suggested that visual attentiveness to the monitor rather than eye contact with the patient may inhibit sensitive or full patient disclosure. Similarly, study of Morton & Wiedenbeck (2010) concluded negative influence of EHR implementation on doctor-patient relationship and highlighted that doctors did not anticipate that their relationships with patients would be impaired by using EHR.

Patel et al. (2002) declared that although EMR can potentially enhance physician-patient interaction through computerizing and automating data entry and allowing timely access to patient information, most of recent researches showed that EMR can have enduring effects on fundamental human reasoning and decision processes involved in health care and can influence the way patient data are gathered, resulting in information loss and disruption of temporal sequence of events in assessing patient problems. David Blumenthal, a well-known American academic and former director of U.S. Federal health information technology initiatives, identified six ways in which e-health tools can enable changes within the profession of medicine and especially in doctor-patient information flow and communication (Weiner, 2012).

1. E-health would be the main source of patient information and would provide doctors with almost everything they need to know about patients.
2. Access to patient information would be limited to authorized clinicians who will be able to access it anytime and anywhere.

3. Almost all types of doctor-patient interactions, either face to face or remote, will be mediated by electronic technology. Type and order of questions asked by physicians to their patient would become, to a large extent, system driven and would greatly depend on what information are in the system and how this information is organized (Patel, Arocha, & Kushniruk, 2002).
4. Web portals open opportunities for patients to participate in their health care and wellness-enhancing processes. Such portals provide patients with access to their health records and provide them with almost as much information about their status as their doctors.
5. Dominance of technology in health care sector, facilitates the provision of massive amounts of information to patients and limits the role of clinicians to serve as navigators and counselors to their patients.
6. Cross-provider e-health systems will also dramatically change communication patterns between providers enabling them all to work as a team and to coordinate their actions far more effectively even if they are not co-located.

2.4.7 Impact on Patient Care

The introduction of health information systems and e-health tools such as medical portals and electronic health records have brought new opportunities for patients to play a more active role in their care and have offered new opportunities for efficient and high-quality patient care (Ammenwerth et al., 2012).

Clinicians will not be persuaded to use e-health systems unless there is a perceived benefit and a tangible added value. The most important added value of e-health is its contribution towards improved patient care (Marshall & Chin, 1998). The relevance of good HIS for high-level quality and efficient patient care is obvious as without having appropriate access to relevant patient data, no proper treatment decisions can be made, which would have fatal consequences on patient care (Haux, 2006). Outcomes of patient care and continuity of care are highly impacted by both the amount and quality of patient information available to medical professionals by e-health systems (Häyrinen et al., 2008).

Electronic portals supply patients with medical information and enable them to get involved in treatment decisions and plans which in turn bears multiple potential benefits such as fostering the quality of patient care and the compliance of patients. However, better-informed patients are not necessarily healthier patients. The findings of a large number of studies assured the absence of a measurable impact of better-informed patients on health, this could be because better-informed patient is only one minor factor contributing to the quality of patient care (Ammenwerth et al., 2012).

The study of Marshall & Chin (1998) on the effects of EMR on patient care concluded that clinicians perceive an improvement in patient care attributed to using a comprehensive outpatient EMR system. This result was attributed to the enhancement in the availability of important clinical information, the enhancement in interdepartmental communication, the effectiveness in decision support tools on patient care outcomes, and the reduction in drug errors such as dosage, interaction with other drugs and drug reactions. Reiner's study on the impact of Picture Archival and Communication System (PACS) implementation on the performance of clinicians and overall patient care demonstrated both objective and subjective improvements in image access and time management. Which in turn provided a further push to radiologists to decrease report turnaround time to provide an added value for patient care (Reiner, Siegel, Hooper, & Protopapas, 1998). Similarly, mobile technologies have the capability to improve quality and safety of patient care by decreasing errors through availing faster, more comprehensive, and more accessible patient documentation at the point and time of care (Junglas, Abraham, & Ives, 2009).

This latter positive perception is in contradiction with the conclusion of Likourezos et al. (2004) study in which he assessed physician and nurse satisfaction with an Emergency Department EMR system. The majority of physicians and nurses reported that the ED EMR would not improve the quality of medical care received by the patients. Similarly, Bloom & Huntington (2010) concluded that a perception of the promised improvement in patient care, provider communications, and billing efficiency due to EHR implementation was not realized in his study. Campbell who studied the consequences related to Computerized Provider Order Entry system implemented in different sites expended that one of the dominant benefits of CPOE is the ability for clinicians to enter orders from anywhere in the hospital, or even from

home. However, such new workflows can cause unexpected duplications or contradictions among orders, to the point of endangering patient care (Campbell et al., 2006). Furthermore, e-health systems often enforce standardization in the use of terminology which is anticipated to benefit the organization and make all parties speak the same language, yet, it can also disrupt clinicians' workflows and get them confused. This may happen when physicians lose professional autonomy and be limited by system features and capabilities. For example, a physician can be limited to an inflexible narration through structured rather than free-text clinical documentation. Therefore, system limitation may compromise patient care (Campbell et al., 2006).

Based on the aforementioned review of literature, it could be concluded that despite the existing discrepancies in the attitudes towards benefits of health information systems, patient care is generally positively influenced.

2.5 Health care at UNRWA Health Centers

Following the 1948 Israeli occupation of Palestine, The United Nations Relief and Works Agency for Palestine Refugees (UNRWA) was established by United Nations General Assembly resolution 302 (IV) of 8 December 1949 to carry out direct relief and works program for Palestine refugees. The Agency began operations on 1st May 1950. The Agency's services encompass education, primary health care, relief and social services, camp infrastructure and improvement, microfinance and emergency assistance, including in times of armed conflict.

For over 60 years, the UNRWA Health program has been delivering comprehensive primary health care services, both preventive and curative, to some 3.5 million Palestine refugees, in its five areas of operations through a network of 143 health facilities in Gaza, the West Bank, Jordan, Lebanon and Syria. In addition, the Agency supports Palestine refugees' access to secondary and tertiary health care services.

Gaza field office, the largest amongst UNRWA's operation fields, provides primary health care services to more than a million refugees scattered across Gaza Strip through 21 health centers. The health program mission in UNRWA is to protect and promote the health of the registered Palestinian refugees.

Human development initiative adopted by United Nations is a process of enlarging people's choices which is achieved by expanding human capabilities. UNRWA aims to achieve the highest possible level of health care to align with the first and most essential capabilities for human development to lead long and healthy lives within the medium-term plan from 2010 until 2015. The objective of this plan is to ensure service quality, unique and comprehensive primary care (both preventive and curative) for the protection and development of family health and control of diseases. A healthy life is a continuum of phases from infancy to old age, each of which has unique specific needs, and the health program therefore takes a 'life-cycle approach' to providing its package of preventive and curative health services (UNRWA, 2016).

UNRWA offers preventive and curative health services to sustain and promote the health of Palestine refugees, from conception through pregnancy, childhood, adolescence and adulthood and active ageing. These services include family planning, pre-conception care, antenatal care and postnatal follow-up, infant care (growth monitoring, medical check-ups and immunizations), school health, oral health, outpatient consultations, diagnostic or laboratory services and the management of chronic non-communicable diseases.

Reproductive Health: includes pre-conception care, antenatal care, intra-natal care, postnatal care and family planning.

1. **Pre-conception Care**: consists of six main components: health promotion, counselling, screening, periodic risk assessments, intervention and follow-up and regular folic acid supplementation
2. **Antenatal Care**: UNRWA encourages pregnant women to follow up with health centers for antenatal care and early pregnancy risk detection and intervention.
3. **Intra-Natal (Delivery) Care**: delivery takes place at UNRWA health centers whenever complications are manageable, otherwise, UNRWA subsidizes hospital delivery.
4. **Postnatal Care**: UNRWA provides postnatal care services through which the mother and the new born are examined and advised about family planning, breastfeeding and caring for the newborn.

5. **Family Planning**: UNRWA facilitate family planning services through medical advice and availing modern contraceptives to those women who decide to do family planning.

Infant and Child Care: Both preventive and curative care is provided with specific interventions to meet the health needs of newborns, infants under 1 year of children, children under 5 years of age and school-age children. Services include newborn assessment, well-baby care, periodic physical examinations, immunization, growth monitoring and nutritional surveillance, micronutrient supplementation, preventive oral health, school health services and care of sick children, including referral for specialist care.

1. Well-Baby Clinic and Growth Monitoring: each health center maintains a system of registration for children under 5 years of age. This system enables the follow-ups for children who have missed important appointments, for example, for immunization, growth monitoring or screening.
2. Immunization: provide immunization against ten diseases: tetanus, diphtheria, pertussis, tuberculosis, measles, rubella, mumps, polio, haemophilus influenza type B (Hib) and hepatitis. In addition, the pneumococcal vaccine is provided in the West Bank and Gaza, and for the first year of the child's life in Jordan.
3. Screening and Medical Checkups: record data on children under the age of 5 who have permanent physical or mental impairments, in order to facilitate medical follow-ups, such as screening newborns for hypothyroidism and phenylketonuria.

School Health: health department provide health care service to students at schools that helps them to overcome health problems and concentrate more for better learning abilities. Some of these health care services are, supplying schools with first aid kits, vitamin "A" for children, deworming program and assistance to children with special health needs. Special attention is given to diseases and disabilities that can negatively influence learning capabilities, such as hearing and vision impairment.

Non-Communicable Diseases (NCDs): continued to account for the vast majority of deaths occurring in UNRWA's host-country populations. They also represent an

increasing health challenge among Palestine refugees, with a steady increase in the number of diabetes and or hypertension patients treated at UNRWA health centers.

Outpatient Care: UNRWA currently provides comprehensive primary health care through a network of 137 health centers, of which 70 are located inside Palestine refugee camps. In addition, UNRWA operates five mobile clinics in the West Bank to facilitate access to health services in areas affected by closures, checkpoints and the Barrier. Utilization of outpatient services Agency-wide reached a total of approximately 9,652,066 medical consultations during 2012. Of these consultations, 211,832 were specialist consultations.

2.6 UNRWA E-Health System and Health Reform

In a way to enhance and improve its health care services. UNRWA, in 2011, began a reform process based on a Family Health Team (FHT) approach and the development of electronic medical records (e-Health). The aim was to modernize its primary health care services, making them more person-centered and more efficient. This model offers a comprehensive and holistic primary healthcare package for the entire family, emphasizing long-term provider-patient and provider-family relationships, and aiming to improve the quality, efficiency and effectiveness of health services, particularly for None Communicable Diseases (NCD). Following subsections expands more on this.

2.6.2 E-Health (Electronic Medical Records)

In 2009, UNRWA started an initiative to develop an in-house electronic medical records system (EMR), later named as the classical e-health system. This initiative was the second part of the major reform of UNRWA health care delivery via which UNRWA pushed away the old fashion, time consuming, costly and labor-burdening inaccurate traditional paper-based system. The EMR supported originally four fundamental modules: None Communicable Disease (NCD), outpatient, child health, and maternal health in addition to other vital supporting modules such as pharmacy, laboratory, dental, and specialist care. It is noteworthy that the system lacks X-Ray and physiotherapy support, plus, although the system has a Laboratory module, it does

not directly communicate with lab machinery and chemical analyzers to gather analysis results, on the contrary, lab results are manually inserted into the system. The main roll of e-health was to facilitate and streamline paperless daily operation at health centers. UNRWA management anticipated a set of benefits all stakeholders would realize comprising better documentation, follow-up of referrals, improved human resources' job performance, increased clinician-patient contact time, reduced patient waiting times, minimized use of stationary and printed forms, more controlled medical stock and eventually better overall patient care via error reeducation and error prevention, better diagnoses and better physician-patient relationship. At the administrative level, e-health was expected to stress the continuous process of quality improvement, enhance staff managerial and administrative capacity and enable information based decision making. The system provides a comprehensive set of health reports and compiles accurate and reliable statistical information and health indicators. The improved information quality supports evidence-based strategic planning for best overall health care outcomes.

In spite of that fact that Family Health Team (FHT) approach has been spreading very fast across the agency health centers, health centers continued use the classic e-health system since the time it was piloted in 2011 until early 2015 when the development unit in HQ-Amman released a new version of the system that included dramatic amendments and alterations to support Family Health Team (FHT) approach. The new FHT-based e-health system is more comprehensive, and it incorporates an interactive interface that accommodates the service and management needs for the FHT. It was commenced with a plan to completely substitute the old classical system by end of 2016. Table (2.1) illustrates status of classical and FHT e-health versions as at Sep-2016.

Table (2.1): e-Health implementation progress in UNRWA areas of operations

e-Health Version	Jordan	Lebanon	Gaza	West Bank	Agency
Classical Version	0	2	4	0	6
FHT version	16	24	16	31	87
In progress FHT version	2	1	1	9	13
Total	**18**	**27**	**21**	**40**	**106**

Number of health centers using classical and FHT e-health versions by Sep 2016, Syria is excluded as the system is not yet implemented due to conflicts.

2.6.1 Health Reform

Late 2011, UNRWA commenced a reform in health service by implementing a new service delivery approach of Family Health Team (FHT). This approach provides a full primary health care package for the entire family, focusing on long-term clinician-patient and clinician-family relationships, and aiming to improve the quality, efficiency and effectiveness of health services. Clinicians at one health center are grouped into teams of health professionals each of which comprise a doctor, nurse and midwife. When a family registers at a health center, it is mapped to one of these teams which becomes responsible for the entire family's health needs, through all stages of the lifecycle. This reform was supported by the parallel introduction of electronic medical records (e-health), and the necessary health center infrastructure upgrades.

By end of 2015, 119 health centers agency-wide had the FHT approach operational. In Gaza, only 4 out of 21 health centers are still having the old classical system due to construction issues.

2.7 Chapter Summary

This chapter addressed study literature and demonstrated efforts exerted by other researchers in the field of implementing information systems at health organizations and the impact such system adoption may have on the daily life of health facilities' staff, operation and delivered medical service. The chapter started by introducing the general conception of information systems then transited to define what health information system is, what it does and what the different types of it are. Thereafter, development of study model was illustrated followed by detailed explanation of model variables with elaboration on the key success factors of e-health systems. Having this covered, the researcher shed light on UNRWA agency, what it is and what it does, before expanding on UNRWA-health department and the recent e-Health System adoption and health reform.

Chapter Three
Previous Studies

Chapter Three: Previous Studies

3.1 Introduction

This chapter lists and investigates a number of previous studies and researches that addressed the implementation of health information system at health organizations and the different aspects and factors that drove such system implementation to succeed or fail and the relationship between HIS implementations and the change in health organization's daily life. This chapter also stops at the benefits and added values as well as problems and shortfalls of e-health system adoption concluded by previous studies and the effects they introduce on the medical realm. Furthermore, many previous studies were investigated in order to stand on the different matching and discrepancy facets between this study and others studies. Other benefits of reviewing literature were identifying issues and problems faced by other studies, the best methodology to use, variables studied to avoid duplications, access to validated questions that would assist measuring variables of this study and many other benefits. By reviewing previous studies, the researcher drew a wider picture of the so far exerted efforts to understand the impact of e-health on health settings and to developer a clearer understanding to the context of the study and its dimensions and characteristics. It was also necessary for selecting proper study variables and setting hypothesis.

3.2 List of Relevant Previous Studies

1. (Cohen et al., 2016)

An importance-performance analysis of hospital information system attributes: A nurses' perspective

This study aimed to prioritize the performance of the HIS attributes based on user evaluations and to identify the relative importance of these attributes to user satisfaction and performance or productivity outcomes.

Data were collected from 154 nurse users surveyed via interview and structured questionnaire regarding the importance of some system attributes represented by system quality, data quality, information quality, and service quality and the effect of such attributes on user satisfaction and productivity performance. Quantitative

responses were analyzed using the partial least squares approach followed by an importance-performance analysis (assessing individual satisfaction along system attributes and then prioritizing improvement efforts according to each attribute's relative importance to users). Qualitative responses; however, were analyzed using thematic analysis to complete and supplement the quantitative findings.

Results showed that user satisfaction is higher when system quality, information quality, and service quality are high and that users are more productive and higher in performance when data quality and service quality in particular are high.

This study focused on priorities of system attributes based on their importance to two outcome variables (satisfaction and productivity), future studies may wish to consider other user outcomes such as job enrichment.

2. (Shah & Peikari, 2016)

Electronic Prescribing Usability-Reduction of Mental Workload and Prescribing Errors

Objective of this study is to investigate how improving electronic prescribing usability would reduce mental workload and the relationship between this reduction and the reduction of prescribing errors. This could be achieved by examining the direct influences of system quality features (interface consistency, Ease of use and error prevention) and information quality on the reduction of mental workload and in turn the increase of error-free performance of physicians in terms of less prescribing errors.

Researchers used a quantitative survey method to collect cross sectional data from 256 out of 778 community physicians with at least 3 months of e-prescribing system experience, yet only 188 usable questionnaires were returned.

Using the model of Peikari et al. of system usability, Researchers concluded that improvement in information quality, system quality (user interface consistency and system ease of use), and mental workload reduction reduces prescribing errors and increases users' outcomes and performance. Furthermore, improvement in *ease of use*, *error prevention*, and *consistency* reduces *mental workload*. However, the study could not prove any relationship between *prescribing error reduction* and *error prevention* neither any relationship between *information quality* and *mental workload reduction*.

This lead to the fact that improving error prevention and consistency of the system and making it easy to use would reduce users' mental workload. Likewise, improving system information quality, ease of use, and consistency would improve performance and reduce physicians'prescribing errors.

Future researches may consider users' characteristics such as experience with the system, optimism toward the technology, and computer knowledge as moderators between system usability and users' outcomes such as reduction of errors and mental workload.

3. (Peikari et al., 2015)

The impacts of second generation e-prescribing usability on community pharmacists' outcomes

Objective of this study is to examine the impacts of user interface usability of the second-generation e-prescribing systems on community pharmacists' outcomes. Researcher employed a robust and rigorous quantitative research method and multivariate data analysis to examine the extent to which second generation e-prescribing usability improves the positive outcomes (including the improvement of communication, facilitation of providing care, reduction of medical errors and workload) amongst community pharmacists. Referring to Malaysian Pharmaceutical Society 589 out of 1979 community pharmacies were selected as the study population for having at least 3 months' experience of working with e-prescribing systems. Using purposive sampling method and following the Krejcie and Morgan67 formula, 230 questionnaires were distributed by mail to the target population, where only 152 usable questionnaires were returned.

The findings indicate that the acquisition of high quality information is important for e-prescribing system success, for better patient care facilitation and for improved pharmacists' performance, the system should produce accurate, timely and relevant information for the pharmacists. It is also found that system consistency and error prevention features improve the ease of use of the system which in turn improves pharmacists' performance (outcomes).

This study provides empirical evidence that greater usability of e-prescribing systems is positively associated with the improvement of community pharmacists' outcomes.

Future researchers should incorporate users' characteristics (such as computer self-efficacy, optimism, etc.) in the model to study how their characteristics predict or moderate system outcomes.

4. (Safdari et al., 2014)

Hospital information systems success: A study based on the model adjusted DeLone and McLean in UMSU hospitals

Objective of this study is to assess HIS success in hospitals of Urmia university of medical sciences based on the model Adjusted DeLone – McLean. Researchers focused their study on *system quality*, *information quality*, and *service quality* components of D&M model. The study was a descriptive-cross sectional study conducted in 2014. Population consisted of all HIS users in the teaching hospitals of Urmia University of Medical sciences. Multi-stage cluster sampling methodology was used to select 180 individuals in various job rankings (medicine, nursing, paramedical, health information management, pharmacy and accounting staffs). Data were collected through a self-structured questionnaire and 150 out of 180 sampled users responded.

Data analysis ascertained that all quality measure had, to a certain extent, accepted level of HIS success rates in spite of the fact that System quality showed higher level of rate of HIS success compared to information quality and service quality. The analysis also identified a set of gaps in each of the three quality measure that managers need to improve if they wish to reach the full user satisfaction.

5. (Ali & Younes, 2013)

The Impact of Information Systems on user Performance: An Exploratory Study

Objective of this research was to study the impact of information systems on user performance in Tunisian companies. The researchers proposed a model combining the Task Technology Fit (TTF), the Technology Acceptance Model (TAM) and Delone & McLean model to evaluate the performance of users in the Tunisian organizations. The model was validated for dimensionality, reliability and construct

validity using a questionnaire administered to 400 users of IS in Tunisian companies. Only 314 returned questionnaires were found valid.

The study concluded that the effects of the implementation of information systems depend on the degree of user acceptance and confirm that user performance is much better when the system is more useful and easier to use. Furthermore, Users believed that providing high quality information reduces errors and resolve performance problems. In addition, the Task Technology Fit model (TTF) and the system quality played an important role in improving the performance quality and increased the volume of users work. The results showed a satisfactory level of adjustment between information systems and users' needs and task requirements. Furthermore, perceived usefulness and perceived ease of use had proven to be very important factors that affect the use of the system and mitigate the impact on user performance. Data analysis emphasized that TTF, system quality and information quality directly influences the performance of users and indirectly through perceived usefulness and perceived ease of use.

Further studying on the impact of user characteristics on individual performance was recommended.

6. Care (Kern et al., 2013)

Electronic Health Records and Ambulatory Quality of Care

Objective of this study is to determine the effect of Electronic Health Records (EHRs) on ambulatory quality in a community-based setting. Researcher conducted a cross-sectional study among primary care physicians in the Hudson Valley region of New York in 2008. The study targeted all primary care physicians (members and volunteers) of the Taconic Independent Practice Association (Carayon, Smith, Hundt, Kuruchittham, & Li), a not-for-profit organization whose membership is drawn from private practices and federally qualified health centers. Restricting the sample to physicians with at least 30 patients for at least one quality measure, Out of the 4,403 providers included in Taconic IPA database, 466 physicians were found qualified for the study (204 had adopted EHRs and 262 were using paper) and had a total of 74,618 unique patients contribute quality data.

The researchers compared physicians using EHRs to physicians using paper on performance for nine quality measures (measures selected for the pay-for-performance program, which were drawn from the Health care Effectiveness Data and Information Set). They also created a composite quality score by standardizing performance against a national benchmark and averaging standardized performance across quality measures. They used generalized estimation equations, adjusting for nine physician characteristics (EHR vs. Paper, Age, Gender, Degree, Specialty, County, Practice size, No of patients, Case mix score and Adoption of a practice management system)

The study concluded that EHR-use was associated with significantly higher physician performance and quality of care. However, as cross-sectional, it cannot prove that EHR usage caused the higher quality of care, thus, future studies should include longitudinal designs.

7. (Aggelidis & Chatzoglou, 2012)

Hospital information systems measuring end user computing satisfaction (EUCS)

Objective of this study is to build upon the existing knowledge relevant to Health Information System's (HIS) *End-Users Satisfaction* and the parameters that influence it by testing past models and suggesting new conceptual perspectives on how end-user satisfaction is formed among HIS users.

The researchers have developed a model based on the end-user's computing satisfaction model of Doll and Torkzadeh, Bailey and Pearson's model, the suggestions of DeLone and McLean, and the findings of other related researches.

The new proposed model focused on information quality, system quality, and service quality as factors directly influence end user satisfaction. It also suggested that service quality influences system quality which in turn impacts information quality. Four constructs namely *Content*, *Format*, *Accuracy*, and *Timeliness* are used to measure *information quality* where *Training*, *Ease of Use*, *Documentation*, *Interface*, and *System Speed* are the constructs used to measure *system quality*. *Service quality* relied on *support in-sourcing* and *support out-sourcing* constructs.

A structured questionnaire together with personal interviews are used to survey 283 out 341 medical, nursing and administrative personnel who interact with HIS on

a daily basis. Respondents are picked from all public hospitals in the region of East Macedonia and Thrace.

First, the new proposed EUCS model is tested for validity and reliability and found to be generally valid robust measure of computing end user satisfaction. Thereafter, this tool was used to measure the relationship among the independent and the dependent constructs. Analysis of the collected data implied that all the independent variables cumulatively explained 93% of the variance of the overall end-user satisfaction. System Quality and Information Quality found to have significant positive relationship with the Overall End-user Satisfaction, however, direct significant effect of Insourcing and Outsourcing Support on the end-user satisfaction could not be compiled. Yet both on them found to directly affect system quality which mediated the effect on user satisfaction. It was also concluded that system quality has a significant direct impact on information quality.

Further research can be conducted into relationships among the antecedents and consequences of end-user satisfaction

8. (Bloom & Huntington, 2010)

Faculty, Resident, and Clinic Staff's Evaluation of the Effects of EHR Implementation

This study aims to investigate the wide impact of EHR implementation on clinical staff of some residency's Family Medicine Center in Sioux Falls, South Dakota, USA. The researchers investigated the impact of EMR and EHR system on the amount of time spent documenting and occurrence of documentation, effect on patient care, interference with other activities, effect on communication and relationships, coding/billing process, and overall efficiency. All faculty and resident physicians, nursing, laboratory, X ray, and business office staff were targeted in this study. A total of 72 personnel were surveyed 8 and 12 months after the implementation of the system with some enhancements applied to the system between the two surveys. The initial survey generated response rate of 75%, while the second one generated a response rate of 57%. Collected and analyzed Data concluded that there was no significant difference among responses of both surveys and both showed physicians

and residents dissatisfaction with the amount of time required for documentation. Likewise, clinicians and clinic staff did not observe any significant benefit of the EHR system to patient care, communications between personnel neither significant improvement in the coding and pilling process. On the other hand, there is a slight improvement in the overall efficiency which is anticipated to flatten soon. Thus, the cried for improvement in patient care, provider communications, or billing efficiency was not realized in this this study. Further studies to ensure users' experiences with EHR must be warranted before wide implementation of the system.

9. (Morton & Wiedenbeck, 2010)

EHR Acceptance Factors in Ambulatory Care: A Survey of Physician Perceptions

This descriptive study aims to explore the social and technical factors that impact physician perceptions toward adoption of an ambulatory EHR system. Researchers inspected computer skills and training, management support, physician involvement and participation, physician autonomy, doctor-patient relationship, perceived ease of use, and perceived usefulness for the sake of determining the factors that have the largest influence on physician attitudes toward accepting EHR. Furthermore, they investigated physicians' traits such as Age, years in practice and tested whether the relationship between such traits and TAM variables is mediated by social factors.

The study was conducted at the University of Mississippi Medical Center (UMMC), an academic-based health care system in Jackson, Mississippi. Researchers used an online survey application to distribute 802 self-rated questionnaires among physicians. However, only 239 usable responses were returned. Analysis of the data collected showed no correlation between physician characteristics and any of the study variables. Yet, the study still concluded that the social and behavioral factors were accurate predictors of EHR attitudes. Doctor-patient relationship was not impaired by using the system. Management support, physician involvement, adequate training, perceived ease of use, and perceived usefulness were found to improve users' attitudes toward using EHR system while physician autonomy may negatively impact attitudes of physicians and limit system utilization.

The overall attitude about EHR use was computed to be 3.74 out of 5 with all means of all variables fall between 3 and 4. While this research was conducted in an ambulatory environment, it recommendations that future studies should consider inpatient settings as well.

10. (Iverson, Howard, & Penney, 2008)

Impact of Internet Use on Health-Related Behaviors and the Patient-Physician Relationship: A Survey-Based Study and Review

This research aims to explore the behaviors of online information-seeking patients and the impact of such information on patient self-care and the patient-physician relationship. Researchers conducted this study at three primary care osteopathic medical clinics outside Detroit, Mich and chose to administer a questionnaire based survey by distributing 300 questionnaires, 100 at each medical clinic among patients. Data collection lasted 10-weeks and only 154 valid responses were eventually collected. 89 respondents reported internet usage to seek health information, out of which 60 one could reach answers for their problems and questions while 37 others reached partial answers. However, the majority (48) of those 89 respondents reported no change in their behavior as a result of internet usage, the other 41 respondents, however, did. These changes encompass more active engagement and more questioning during physician office visits and greater adherence to physician advice. They also increased use of herbal products or dietary supplements. The study concluded that although obtaining medical information has it valuable benefits to patients and treatment process, it may introduce a serious burden on physicians and other medical resources and may increase requests for inappropriate or unavailable testing or treatment.

This study concentrated on patient as key player in the patient-physician relationship, future studies should examine the effects from both parties' perspectives as well as from a larger, socioeconomic point of view.

11. (Sequist et al., 2007)

Implementation and Use of an Electronic Health Record within the Indian Health Service

Objective of this study is to evaluate clinicians' perceptions regarding the implementation of an advanced Electronic Health Record (EHR) within a health care system called Indian Health Service (IHS), a federally funded health system provides care to members of American Indian and Alaska Native tribes across the United States through an integrated network of ambulatory health centers and hospitals, serving a minority population with limited resources.

A questionnaire was closely developed and distributed among 223 primary care clinicians practicing at 26 IHS health centers where EHR was implemented between 2003 and 2005. Questionnaire measured Use of individual key functions within EHR, Clinician attitudes regarding the impact of the EHR and IT on quality of care, patient safety, patient–doctor interactions, rural and underserved health care, and delivery of culturally appropriate care, and barriers to effective implementation of EHR.

Out of the 223 surveyed clinicians only 125 valid questionnaires returned.

Data analysis showed that two-thirds of the responses indicated positive attitudes towards EHR implementation. One-third believed that the EHR improved overall quality of care, while many others felt that it decreased the quality of the patient–doctor interaction. One-third of clinicians reported that quality improvement was strongly associated with increased utilization of the EHR. The majority of clinicians felt that information technology could potentially improve quality of care in rural and underserved settings through the use of tools such as online information sources, telemedicine programs, and electronic health records.

Future studies should focus on assessing changes in clinician attitudes towards EHR implementation and its actual impact on improving quality and safety

12. (Margalit et al., 2006)

Electronic medical record use and physician–patient communication: An observational study of Israeli primary care encounters

This is an observational study aims to investigate the different levels of individual physician use of EMR systems and the effect on physician-patient communication. Researchers focused on the keyboarding and screen gaze and their impact on data gathering, patient education, and counseling. They also studied the impact on patient-centeredness and building relationship and partnership with patients. Researchers relied in this study on a larger study of medical education in which 8 family physicians with a minimum of 5 years of EMR usage were targeted and their consultations with 233 of their patients were videotape-recorded. For this research only 3 doctors from three different clinics with ten consecutive patients for each were randomly selected for analysis. Roter Interaction Analysis System (RIAS), a standardized system for analysis of medical communication that codes communication into mutually exclusive and exhaustive categories, was used to analyze the collected data. Analysis compiled that, there is a positive correlation between both screen gaze and keyboarding and the length of the visit. Results also highlighted the significant relationship between computer use and physician performance of data gathering, patient education and counseling functions. Patient disclosure was found to have positive relationship with the levels of physician keyboarding. Orienting statements (transition statements, instructions, and directions) however, had inverse relationship with screen gaze. Likewise, screen gaze found to lessen emotional and psychological exchange between physicians and patient in spite of the fact that this was statistically insignificant. Although keyboarding was found to positively relate to visit length, it was found to inversely relate to the number of statements communicated by physicians. Finally, patient centeredness was negatively affected by both keyboarding and screen gaze. Further research is still needed to fully grasp the different accepted of EMR-use influence on consultation, future researches may inspect the introduction of EMR into outpatient care settings.

13. (Hayajneh et al., 2006)

Extent of Use, Perceptions, and Knowledge of a Hospital Information System by Staff Physicians

This study aims to emphasize physicians' use, perceptions, and knowledge in connection with a computerized hospital information system (HIS) implemented in a large Jordanian teaching hospital in 2003. Researchers focused on Use of Computers, Use of the HIS, Physicians' Knowledge about the System to investigate the extent of system acceptance and utilization and to inspect whether the system was achieving its intended objectives, at the same time, they examined the impact of HIS on information accessibility, information security and privacy, effectiveness of staff communication, quality of services, system efficiency and human resource performance. Three years after the adoption of the system, the researchers conducted their study using a cross-sectional descriptive survey design in which a 38-question questionnaire was disseminated among 50 out of 82 eligible doctors who performed in the hospital before and after the implementation of HIS, yet only 29 valid responses were collected. Analysis of the collected data compiled that nearly half of the respondents found the system as not easy to use and some 72% of them were not completely aware of all system features. Majority of respondents reported improved speed and ease of access to various types of information whilst they criticized low security and weak privacy and confidentiality measures. On the other hand, Respondent had general positive perception that effectiveness of staff communication was improved. Attitudes regarding system quality contradicted, yet, the majority did not perceive real tangible improvement in service quality and likewise, perception regarding system efficiency was also negative except for limiting nepotism (Waseta). Similarly, physicians did not agree with the conception that HIS had improved HR performance nor made staff responsibilities any clearer.

Further studies are recommended to address the possible causes of confidentiality and security failure and to identify solutions.

14. (Likourezos et al., 2004)

Physician and nurse satisfaction with an electronic medical record system

This study aims to measure satisfaction of doctors and nurses with an EMR system implemented at the emergency department of a large urban teaching hospital affiliated with school of medicine of University of California. Three months after the implementation of the system researchers had administered a cross-sectional survey utilizing 57-paragraph questionnaire to evaluate physicians' and nurses' computer background and experience; perceptions regarding EMR use; and impact of EMR on quality of patient care. Questionnaire was distributed among all 115 clinicians at the emergency department, yet only 44 (23 physicians and 21 nurses) usable responses were returned.

Analysis of data collected concluded that clinicians perceived that EMR was easy to use and that the system had fair impact on their work. On the other hand, clinicians perceived limited impact on patient care as patients didn't feel improvement in the quality of medical care they received, no decrease in patient waiting time, in the number of laboratory tests, in number of ED visits, neither attenuating ED overcrowding. One more reason caused negative attitude toward EMR was the concerns about security, privacy, and confidentiality of patient information being accessed by unauthorized people. There was no strong evidence to correlate computer background and experience to satisfaction with an EMR. Despite the minimal improvement in patient care, clinicians preferred the use of EMR and suggests improvements.

Researchers noted that this study was applied on a relatively small sample and on a newly adopted EMR system and recommended that further work should target larger samples from a variety of sites and centers that use different EMR platforms.

15. (Patel et al., 2002)

Patients' and physicians' understanding of health and biomedical concepts: relationship to the design of EMR systems

This study aims to understand the perception behind physician-patient relationship and how such communication between the two parties is influenced by the adoption of Electronic Medical Record (EMR) system. The study was split into two parts. In the first part, researcher had interviewed patients ahead to their interaction with physicians and then physician-patient communication was recorded and analyzed to assess how both parties understood patient's medical problem. In the second part of the study, however, researchers held a comparison between paper-based and EMR contents and the ways patient data were collected and organized for making proper medical decisions.

The study was conducted at a community clinic of the McGill University affiliated teaching hospital in Montreal, Quebec, Canada.

Analysis of interviews and data collected pointed out the very apparent variance between physicians and patients in explaining patients' problems, patients relied on the narrative structure of the disease while doctors explained the problem using casual pathophysiological terms. The traditional physician-patient interaction for data gathering was patient-centered and found to enrich the documentation with historical flow of events and key aspects of the patients' narratives. Whereas, the use of EMR was found to be system-driven and physician-centered and introduced crucial and complex changes to the way physicians interact with patients and on the data recorded. Examined EMR suffered from information loss caused by the reduction in potential patient information such as patients' perception on their diagnoses, health, and prior beliefs. Loss of contextual information also contributed to inconsistent and incomplete patient records. Reasoning patterns are also significantly affected by the nature of EMR structured data that replaced patients' narrative stories.

The type and nature of processes involved in interacting with paper and electronic records may differ among different systems, thus it is recommended that such effect of EMR on physician-patient relationship is tested in various EMRs and different medical domains.

16. (Makoul, Curry, & Tang, 2001)

The Use of Electronic Medical Records: Communication Patterns in Outpatient Encounters

This exploratory, observational study aims to evaluate how EMR systems in outpatient settings affect physician-patient communication patterns. This research was administered at the general internal medicine faculty practice of an urban, academic medical center in Chicago 18 months after the implementation of the commercial "EpicCare" EMR system. Six physicians were targeted by this study, three of which were using EMR for at least 2 years whilst the other three physicians were using paper charts instead. Researchers made use of three data collection instruments to gather data from 204 clinical encounters, 34 visits for each included physician.

Five-page Consultation and Patient Appraisal (CAPA) questionnaire was the first instrument used by the researchers to identify physicians with similar attitudes toward CAPA's inventory of communication tasks and patient characteristics. Upon the results of this questionnaire the targeted six physicians were selected. The second tool was videotape recording of the encounters took place between the subject physicians and 204 of their patients. Videos were then used to assess physician-patient interaction using the SEGUE Framework, a check list of yes/no questions to inspect whether physicians (EMR users or Paper Charts users) accomplished necessary communication tasks during encounter. The third instrument, however, was the revision of the historical medical record of each participating patient to capture age, gender and number of previous visits. Analysis of collected data suggested that EMR users could clarify information more actively, could encourage patient to interact more and to get involved via welcoming questions and warranting completeness of the visit. On the other hand, they were found less active in more patient-centered areas such as scheduling of patient's plan, exploring psychosocial/emotional issues, and discussing the impact of health problems on patient's life.

Emphasizing how crucial the physician-patient eye contact is, EMR users where less flexible in maintaining such contact with patients due to the fixed computer positions. Furthermore, EMR physicians' encounters lasted longer compared to paper chart physicians, especially in the initial visits.

Building on the aforementioned elaboration, EMR system found to enhance several aspects of physician-patient communication, whereas, it still limits other vital aspects.

Further research may build on the findings of this study and explore more productive training methods to understand how to elevate the potential benefit of EMR systems for both patients and providers.

3.3 Summary of Previous Studies

Table (3.1): Summary of previous studies

No	Study Citation	Independent Variables	Dependent Variables	Findings
1	(Cohen et al., 2016)	-System Quality -Data Quality -Information Quality -Service Quality	-User satisfaction -User Performance (productivity)	User satisfaction found to be higher when system quality, information quality, and service quality are high and users were found to be more productive and higher in performance when data quality and service quality in particular are high
2	(Shah & Peikari, 2016)	-Information Quality -System Quality (user interface, consistency, ease of use)	-Mental workload reduction -Physician Performance (Reduction of prescribing errors)	-Information quality, system quality, and mental workload reduction reduces prescribing errors and increases users' job performance - Improvement in ease of use, error prevention, and consistency reduces mental workload -No relationship between prescribing error reduction and error prevention, neither between information quality and mental workload reduction
3	(Peikari, Shah, Zakaria, Yasin, & Elhissi, 2015)	-Information Quality -Ease of Use	-Pharmacists' Outcomes (Workload, Error reduction, Communication, Patient Care)	-High quality information is important for system success, improved performance and better patient care. -System consistency and error prevention features improve the ease of use of the system which in turn improves pharmacists outcomes
		-Error prevention -Consistency	-Ease of Use	
4	(Safdari et al., 2014)	-System Quality -Information Quality -Service Quality	-HIS Success	The three quality measure had, to a certain extent, accepted level of HIS success rates in spite of the fact that System quality showed higher level of rate of HIS success compared to information quality and service quality. Full user satisfaction needs an improvement plan.
5	(Ali & Younes, 2013)	-Technology Task Fit -Information Quality -System Quality -Perceived Ease of Use -Perceived Usefulness	-User Performance	All independent variables found to affect user performance both directly and with mediation by perceived usefulness and perceived ease of use

No	Study Citation	Independent Variables	Dependent Variables	Findings
6	(Kern et al., 2013)	-EHR Adoption Success	-Physician's Performance -Quality of Care	The study concluded that EHR-use was associated with significantly higher physician performance and quality of care.
7	(Aggelidis & Chatzoglou, 2012)	-Information Quality -System Quality -Insourcing Support -Outsourcing Support	-End User Satisfaction	-System Quality and Information Quality have significant positive relationship with the Overall End-user Satisfaction. -system quality has a significant direct impact on information quality -Insourcing and Outsourcing Support indirectly affected end-user satisfaction by the mediation of system quality
8	(Bloom & Huntington, 2010)	-EHR Adoption Success	-Time required for documentation -Patient care -Communications among staff -Coding and pilling process -Overall efficiency	Staff was dissatisfied with the amount of time required for documentation. Likewise, no significant benefit of the EHR system on patient care, communications among personnel neither significant improvement in the coding and pilling process. Yet, there is a slight improvement in the overall efficiency which is anticipated to flatten soon
9	(Morton & Wiedenbeck, 2010)	-Management support -Adequate training -Physician involvement -Perceived ease of use -Perceived usefulness -Physician autonomy -Doctor-patient relationship	-Attitude about EHR usage	-Social and behavioral factors were accurate predictors of EHR attitudes -Doctor-patient relationship was not impaired by using the system. -Management support, physician involvement, adequate training, perceived ease of use, and perceived usefulness were found to improve users' attitudes toward using EHR system while physician autonomy may negatively impact attitudes of physicians and limit system utilization.
		-EHR Adoption and usage	-Doctor-patient relationship	
10	(Iverson, Howard, & Penney, 2008)	-Medical Information	-Patient–Doctor Interaction	Although obtaining medical information has it valuable benefits to patients and treatment process (more active engagement and more questioning during physician office visits and greater adherence to physician advice), it may introduce a serious burden on physicians and other medical resources and may increase requests for inappropriate or unavailable testing or treatment.

No	Study Citation	Independent Variables	Dependent Variables	Findings
11	(Sequist et al., 2007)	-EHR Adoption Success (Use of individual key functions within EHR)	-Quality of Patient Care -Patient–Doctor Interaction -Patient Safety	Implementation of EHR is highly successful, yet One-third believed that the EHR improved overall quality of patient care and safety, while many others felt that it decreased the quality of the patient–doctor interaction
12	(Margalit et al., 2006)	EMR systems use	-Data gathering from patients -Patient education and counseling -Building a relationship with patients -Activating and partnering -Patient-centeredness	-Screen gaze and keyboarding positively correlate to length of the visit -Computer use positively relates to physician performance of data gathering, patient education and counseling functions -Patient disclosure positively relates to the levels of keyboarding -Screen gaze negatively impact Orienting statements (transition statements, instructions, and directions) -Keyboarding inversely relates to the number of statements communicated by physicians -Patient centeredness negatively affected by both keyboarding and screen gaze
13	(Hayajneh et al., 2006)	-Use of the HIS -Physicians' Knowledge about HIS	-HIS system acceptance	-52% found the system as not easy to use and 72% were not completely aware of all system features -Improved information speed and ease of access but not security -Generally, improvement in effectiveness of staff communication was perceived -Service quality, System efficiency and HR performance were not perceived as improved.
		-EMR systems adoption	-Information Accessibility -Information Security and Privacy -Effectiveness of Staff Communication -Quality of Services -System Efficiency -HR Performance	
14	(Likourezos et al., 2004)	-EMR systems adoption	-Computer background and experience -Perceptions regarding EMR use -Impact on quality of patient care.	-Clinicians perceived that EMR was easy to use and that the system had fair impact on their work -Limited impact on patient care

No	Study Citation	Independent Variables	Dependent Variables	Findings
15	(Patel et al., 2002)	-EHR Adoption Success	-Patient–Doctor relationship -Data quality (completeness, consistency , relevance)	-Physicians explained the patient problems in terms of causal pathophysiological knowledge, whereas patients explained them in terms of narrative structures of illness -EMR caused information loss and disruption of temporal sequence of events in assessing patient problem
16	(Makoul, Curry, & Tang, 2001)	-EMR systems adoption	-Patient–Doctor Interaction	EMR users could clarify information more actively, could encourage patient to interact more and to get involved via welcoming questions and warranting completeness of the visit. Yet, less active in patient-centered areas such as scheduling of patient's plan, exploring psychosocial/emotional issues, and discussing the impact of health problems on patient's life. EMR negatively affected eye contact and made patient visit longer.

3.4 Commenting on Previous Studies

After reviewing a number of previous studies that addressed similar study topics to the current one, this section will elaborate researcher comment on previous studies by addressing the various matching aspects as well as the differences between the current study and previous ones.

3.4.1 Matching and consistency with previous studies

This section concentrates on the various agreement between this study and previous studies in terms of study environment, study variables, methodology used and main data analysis tools used to analyze primary data of the study.

3.4.1.1 Study Environment

The current study was conducted at primary care health centers where e-health system was implemented and users have already started to use and practice. This environment is consistent with many previous studies' environments which were conducted in health organizations with one or more computerized health supporting systems was in operation and being utilized by health facilities' staff. Study of Cohen et al. (2016) for example was conducted at 570-bed public hospital, Safdari et al. (2014) was conducted at Teaching hospitals of Urmia University of Medical Sciences. Likewise, Kern et al. (2013) targeted ambulatory practices in the Hudson Valley of New York. Aggelidis & Chatzoglou (2012) was held at main public hospitals in the region of East Macedonia and Thrace, and similarly, Bloom & Huntington (2010) had targeted residency's Family Medicine Center in Birmingham, England. Morton & Wiedenbeck (2010) was conducted at University of Mississippi Medical Center, Iverson et al. (2008) targeted three osteopathic primary care medical clinics outside Detroit, Mich. Sequist et al. (2007) was held at primary care ambulatory health centers and hospitals affiliated with Indian Health Service (IHS), a federally funded health system for Native Americans. Margalit et al. (2006) was also conducted at primary care facilities. Likewise Hayajneh et al. (2006) was conducted at a Jordanian teaching hospital, similarly Likourezos et al. (2004) targeted urban teaching hospital affiliated with school of medicine of University of California. Patel et al. (2002) was held at community clinic of the McGill University affiliated teaching hospital in Montreal, Quebec, Canada.

Makoul et al. (2001) was also held at general internal medicine practice at an academic medical center in Chicago, and finally, Marshall & Chin (1998) was held at Kaiser Permanente Northwest in Oregon and Southwest Washington (Center for Health Research).

3.4.1.2 Study Variables

This study has agreed with many previous studies in inspecting the impact of implementing health information systems at health facilities and organizations on the different aspects of clinical activities and performance.

This study dealt with impact of HIS on user performance and this was consistent with Ali & Younes (2013) studied the impact of information systems on user performance, Peikari, Shah, Zakaria, Yasin, & Elhissi (2015) which addressed the impacts of second generation e-prescribing usability on community pharmacists outcomes, Kern et al. (2013) which investigated the effect of EHRs on ambulatory quality in terms of physician's performance and quality of care, and Hayajneh et al. (2006) which studied impact of EMR systems adoption on human resources' performance. Furthermore, this study investigated the impact of health information systems on physician-patient relationship which harmonized with many previous studies that addressed such impact. All of Sequist et al. (2007), Patel et al. (2002), Morton & Wiedenbeck (2010), Marshall & Chin (1998), Makoul, Curry, & Tang (2001), and Iverson, Howard, & Penney (2008) explored the impact of HER/EMR adoption success on Patient–Doctor Interaction. Likewise, this study examined the impact of health information systems on patient care which agreed with many previous studies that focused on same impact. All of Peikari, Shah, Zakaria, Yasin, & Elhissi (2015), Kern et al. (2013), Sequist et al. (2007), Bloom & Huntington (2010), Margalit et al. (2006), Marshall & Chin (1998), and Likourezos et al. (2004). Noteworthy that this study relied on information quality and system quality as main determinants of system implementation success which was consistent with many other previous studies such as Ali & Younes (2013), Cohen et al. (2016), Safdari et al. (2014), Etezadi-Amoli & Farhoomand (1996),Aggelidis & Chatzoglou (2012), and Shah & Peikari (2016).

3.4.1.3 Methodology and Study Tools

This study followed the descriptive analytical methodology where target sample members were surveyed using a quantitative self-developed questionnaire. This methodology has dominated other previous studies that made used of quantitative questionnaire to survey their target populations' and collect study primary data. For example all of the following studies used quantitative questionnaire to collect primary data of their studies. Shah & Peikari (2016), Peikari et al. (2015), Safdari et al. (2014), Ali & Younes (2013), Bloom & Huntington (2010), Morton & Wiedenbeck (2010), Iverson et al. (2008), Sequist et al. (2007), Hayajneh et al. (2006), Likourezos et al. (2004), Marshall & Chin (1998), Etezadi-Amoli & Farhoomand (1996).

3.4.1.4 Data Analysis Methods

This study made use of Partial Least Squares/Structural Equation Modeling (PLS/SEM) technique to analyzing collected data and addresses research hypotheses. This has harmonized with many previous studies that used the same technique to analyze their study data. All of the following studies, for instance, used the structural equation modeling through different analysis software application such as AMOS, PLS, and LISREL to test their study models and hypotheses. Cohen et al. (2016), Shah & Peikari (2016), Peikari et al. (2015), Ali & Younes (2013), Aggelidis & Chatzoglou (2012), Morton & Wiedenbeck (2010), Etezadi-Amoli & Farhoomand (1996).

3.4.2 Discrepancy and Differences from Previous Studies

This section concentrates on the various disagreement between this study and previous studies in terms of study environment, study variables, methodology used and main data analysis tools used to analyze primary data of the study.

3.4.2.1 Study Environment

The current study was conducted in Gaza-strip, region under blockade and limited in all kinds of medical and professional resources, to address e-health system implemented at UNRWA primary care health centers. Having reviewed literature, researchers have stopped at some previous studies that had different study environment

while still addressing similar subjects and dealing with similar variables, some of which are: Shah & Peikari (2016) which targeted community health professionals, primary care providers who usually work out of health facility boundaries. Peikari et al. (2015) was held at Malaysian pharmaceutical society - community pharmacies, Ali & Younes (2013) targeted Tunisian companies with information systems adopted.Etezadi-Amoli & Farhoomand (1996) was issued in 22 different organizations utilizing focal point in each for data collection.

3.4.2.2 Study Variables

The current research focused on studying the impact of information quality and system quality on user performance, physician-patient relationship and patient care and tested how perceived usefulness and perceived ease of use influence such impact.

Some previous studies showed discrepancy in study variables via discussing factors not covered in this research. Cohen et al. (2016) for example considered data quality and service quality as successful factors for HIS and inspected the impact of HIS adoption on user satisfaction, Shah & Peikari (2016) inspected the effect of HIS on mental workload reduction, Peikari, Shah, Zakaria, Yasin, & Elhissi (2015) studied effect of HIS on error reduction and workload. Ali & Younes (2013) added technology task fit to HIS success factors and inspected its impact on user performance. Aggelidis & Chatzoglou (2012) investigated insourcing and outsourcing support influence on end user satisfaction. Bloom & Huntington (2010) dealt with the impact of HIS adoption on time required for documentation, communications among staff, coding and pilling process and overall efficiency, and Morton & Wiedenbeck (2010) investigated system user attitudes towards EHR usage.

3.4.2.3 Methodology and Study Tools

The current study followed a quantitative approach together with questionnaire as a data gathering instrument. Descriptive analytical methodology was also followed to describe respondents' attitudes and to analyze data and test hypotheses.

Some previous studies showed discrepancy in study methodology compared to the methodology used in this study, for instance, Cohen et al. (2016) used both quantitative (structured questionnaire) and qualitative (interviews) tools, while Kern et al. (2013) conducted cross-sectional study depending on full secondary data collected by the Independent Practice Association (IPA) in April 2008. Aggelidis & Chatzoglou, 2012) used structured questionnaire based survey via personal interviews. Margalit et al. (2006) used videotape-recording for encounters to capture and characterize non-verbal behavior. Hayajneh et al. (2006) used cross-sectional descriptive survey. Patel et al. (2002) made use of audio-recorded interviews with patients before and after encounters. Makoul et al. (2001) was exploratory, observational study and made use of videotaped encounters, questionnaires, and medical-record reviews. Marshall & Chin (1998) was cross-sectional study with questionnaire and semi-structured interviews with key personnel. Likewise, Etezadi-Amoli & Farhoomand (1996) used both questionnaires and interviews.

3.4.2.4 Data Analysis Methods

The current study used frequency and descriptive analysis to describe study sample, t-test to inspect respondents attitudes and Partial Least Squares/Structural Equation Modeling (PLS/SEM) technique to analyzing collected data and addresses research hypotheses. Many previous studies were inconsistent with this current study in terms of the methods used to analyze data and test hypotheses. Safdari et al. (2014) and Kern et al. (2013) used t-test and chi-square using SPSS software to execute descriptive and analytical statistics. Bloom & Huntington (2010) inspected two sets of data collected in two different times and used both chi square and Mann-Whitney U tests, similarly Likourezos et al. (2004) applied Mann-Whitney test for continuous variables and chi-square or fisher test for categorical variables. Iverson et al. (2008) and Makoul et al. (2001) used x^2 analysis. Sequist et al. (2007) used multivariable logistic regression models. Margalit et al. (2006) applied the Roter Interaction Analysis System (RIAS) system. Hayajneh et al. (2006) relied on frequencies, percentages, means and standard deviation. Patel et al. (2002) used cognitive analysis and finally Marshall & Chin (1998) used descriptive analysis.

3.5 Benefits Grasped from Previous Studies

Reviewing literature and previous studies highly contribute to a wider understanding of the different contexts and scenarios of studying implementation of health information systems at health organizations, and sheds light on the importance of addressing implementation success factors and the tough consequences of system failure. Most of previous studies showed that researchers built study models on different sociotechnical theories and keep amending on these models by adding and removing variables or by integrating multiple models together for best reaching clearer understanding of the impact of e-health adoption on the different aspects of medical organizations and identifying factors that stimulate or hinders success. Previous studies also assisted in identifying variables mostly used by researchers and the tools used to measure these variables which in turn assisted the researcher to pick the current study variables and provided validated measuring tools that researchers could rely on to build current study model and to test study variables. One more benefit is having wider grasping of the different study designs and touching dominant methodologies used by other researchers so as to select study design and methodology that best suits the nature of current study. Furthermore, data collection tools are very vital benefit of reviewing previous studies as the researcher can stand on the different data gathering instruments and identify the dominant ones and select the one best fits with this study design and context. Previous studies also suggest a set of proposed future studies from which the researcher can choose and declare a number of limitations that researcher should work to overcome. One of the most valuable benefits of previous studies is to compare study results with other similar studies' conclusions to ensure validity and rationale of study results.

3.6 What Makes This Study Special

1. This study is conducted in Gaza strip which has its special unstable political, economic and industrial environment. Gaza is under crippling siege since 2006 and suffers shortage in almost everything, medicine, pharmaceuticals, medical equipment, and professional experience. This special environment also lacks scientific researches due to limitation in resources and fund. Conducting the current study in such environment makes it special.

2. Although this study is not the first in Gaza-strip to address e-health systems, it is the first to address e-health system at UNRWA health centers which is the only system in GAZA that fully replace paper-based system to convert health centers to fully computerize workplace.
3. This study addresses issues in a current system being implemented at UNRWA health centers, study outcome and conclusion together with researcher practical recommendation could be a vital source for both health management and system developers to stand on system shortfall and possible interventions.
4. This study also contributed to literature, up to the knowledge of the researcher, by addressing the impact of individual e-health success factors on both physician-patient relationship and patient care constructs. Most previous studies concentrated on the impact of health system adoption as a whole on these two subject variables and one can hardly-ever stop at studies that addressed effect of individual success factors on them.
5. This study also integrated both D&M system success model and TAM model with some additional amendments creating a new tested and validated model that can be used by other researchers to address similar conceptual investigations.

3.7 Chapter Summary

This chapter has listed a number of previous studies dealt with the implementation of health information systems at health organizations/facilities and the influence they had on work activities and human resources' performance. It also covered several aspects of matching and mismatching between the current study and other studies in terms of environment, methodology, variables studied and data analysis tools used to test gathered data, then lessons learnt from previous studies were shed light on via standing on benefits of reviewing literature. Finally, it emphasized what makes this study distinguished.

Chapter Four
Research Methodology

Chapter Four: Research Methodology

4.1: Introduction

This chapter describes the tools, procedures and methodology used in conducting this study. It also expands on describing study population and identifies how study-sample was selected. Then it sheds light on the used instruments and how these instruments were prepared, constructed and tested for validity and reliability. The chapter also covers data collection tools and criteria and addresses the statistical tests used to analyze collected data.

4.2 Research Methodology

In order to achieve the objectives of this study, the researcher uses the descriptive analytical methodology as it has been found the dominant among other methodologies used to study Electronic Health Records (Nguyen et al., 2014). This methodology concentrates on describing and analyzing existing phenomena and practices in order to identify the nature and type of the relationship among the different study factors and the direction of such relationships.

Researchers used the quantitative approach to survey the target samples as survey is one of the most effective tools in Information Systems researches (Sequist et al., 2007). It can easily cover large populations with least time, cost and effort. In a review of 98 identified papers by Nguyen et al. (2014), it was found that survey as study design is the most dominant design (used in 50 papers, questionnaires only in 37 papers and mixed with other methods in 13 other papers). This design is best for assessing impact of newly deployed applications on the daily operations and work flow of small business.

The researcher reviewed a number of previous studies, papers and articles in order or identify studied areas and stand on the best variables to address in this research. Furthermore, the researcher developed a questionnaire as a data collection tool to survey and analyze attitudes of clinical staff toward the adoption of e-health system. Collected data are extracted, coded, analyzed and tested using convenient statistical tests to shed any significant influence for system adoption factors on medical performance and health care.

4.3 Population and Sample

UNRWA is gradually adopting e-health system which is currently implemented solely at 20 out of 21 health centers (4 Classic, 16 FHT). Targeted population of this study is health centers' medical and admin staff who make use of the system and who have already developed attitudes toward the system operability and effect on the clinic daily activities (staff members such as cleaners, doorkeepers and clinicians who don't utilize the system are excluded from the population). Table (4.1) illustrates the distribution of population among the 20 operating health centers sorted by location from north to south, number of staff members who use the system regularly and the rate of population per health center.

Table (4.1): Number and rate of e-health system users at health centers

No	Health Centers	System Type	E-health Users	Rate
1	Jabalia	FHT	65	10.55%
2	North-Gaza	FHT	33	5.36%
3	Shaikh-Radwan	FHT	27	4.38%
4	Rimal	FHT	52	8.44%
5	Beach	FHT	29	4.71%
6	Gaza-Town	FHT	34	5.52%
7	Sabra	FHT	31	5.03%
8	West-Nusairat	Classic	17	2.76%
9	Nusairat	Classic	39	6.33%
10	Buriej	Classic	27	4.38%
11	Maghazi	Classic	22	3.57%
12	Deir-Balah	FHT	27	4.38%
13	Japanese	FHT	21	3.41%
14	Khan-Younis	FHT	43	6.98%
15	Maen	FHT	34	5.52%
16	Naser	FHT	11	1.79%
17	Rafah	FHT	44	7.14%
18	Shaboura	FHT	22	3.57%
19	Tel Sultan	FHT	27	4.38%
20	Shouka	FHT	11	1.79%
Total			**616**	**100%**

Source: Health Department, Unrwa/Gaza Field Office (Sep-2016)
FHT: e-Health system supporting family health team structure
CLASSIC: Older version of e-health system

Samples size is calculated based on the following equation of Cochran (1977),

Sample-size : $SS = (Z\text{-score})^2 \times StdDev \times (1\text{-}StdDev) / (\text{margin of error})^2$
Adjusted Sample size : $SSa = (SS) / (1 + (SS - 1) / \text{population})$
Where Z-score is given as 1.96
StdDev is Standard Deviation of the worst case, taken as 50%
Margin of error is the error interval and I will take it as 5%

Substituting population as 616 in the above equation, sample is calculated as follows,
Sample-size $= (1.96)^2 \times 0.5 \times (1 - 0.5) / (0.05)^2 = 384$
Adjusted Sample size $= 384 / [1 + (384 - 1) / 616] = 237$

Researcher used simple cluster random sampling technique to pick up sample members from each health center proportional to its size in population. Table (4.2) illustrates the distribution of sample size among health centers.

Table (4.2): Distribution of sample size among health centers

No	Health Centers	H.C. Population	Sample Needed	Sample Rate[1]
1	Jabalia	65	25	10.5%
2	North-Gaza	33	13	5.5%
3	Shaikh-Radwan	27	10	4.2%
4	Rimal	52	20	8.4%
5	Beach	29	11	4.6%
6	Gaza-Town	34	13	5.5%
7	Sabra	31	12	5.1%
8	West-Nusairat	17	7	3.0%
9	Nusairat	39	15	6.3%
10	Buriej	27	10	4.2%
11	Maghazi	22	8	3.4%
12	Deir-Balah	27	10	4.2%
13	Japanese	21	8	3.4%
14	Khan-Younis	43	17	7.2%
15	Maen	34	13	5.5%
16	Naser	11	5	2.1%
17	Rafah	44	17	7.2%
18	Shaboura	22	8	3.4%
19	Tel Sultan	27	10	4.2%
20	Shouka	11	5	2.1%
	Total	**616**	**237**	**100%**

*1. **Sample Rate**: rate of health center's portion from the total sample size*

4.4 Research Instruments

A questionnaire was developed and used to survey the target sample as it has been found the dominant technique used in 50 out of 98 papers systematically reviewed by Nguyen et al. (2014). It is also one of the most effective tools in information systems researches as it can easily cover large population with least time, cost and effort (Sequist et al. (2007). Upon the aforementioned, a questionnaire was designed to fit the proposed model of this study. Its measuring paragraphs were inspired from instruments used in previous studies as well as the definitions of study model constructs provided in literature. This questionnaire comprised two main parts, part-I covered the demographic traits of the respondent such as age, sex, specialization, experience…etc. while part-II covered the measurement of all study variables. Seven-degrees Likert-type attitude scale together with a set of 59 paragraphs were used to draw attitudes of respondents toward the seven study variables. Likert scale is a psychometric scale that has multiple categories from which respondents choose to indicate their opinions, attitudes, or feelings about a particular issue. The questionnaire was first designed based on tested and validated measures inherited from previous studies, information quality and system quality paragraphs for example were extracted from Ali & Younes (2013), Cohen et al. (2016), and Maamuom et al. (2013), while perceived usefulness questions were picked from Gagnon et al. (2014) and Morton & Wiedenbeck (2010). Similarly, paragraphs of perceived ease of use where extracted from Peikari et al. (2013), Morton & Wiedenbeck (2010), and Gagnon et al. (2014). User performance paragraphs, however, were dragged from Ali & Younes (2013) and Junglas et al. (2009) and questions of impact on patient care were taken from Likourezos et al. (2004). Finally, paragraphs of Doctor-Patient Relationship were drawn from Morton & Wiedenbeck (2010). These measuring paragraphs were then amended and customized to fit with the nature and position of the current study. Next, the developed questionnaire was presented to 9 experts to criticize and comment on its paragraphs before being piloted on a 30-respondent sample. Comments and recommendations were implemented. Thereafter, the final version of the questionnaire was eventually produced. The questionnaire was initially designed in English, then it was translated into Arabic to overcome any miscommunication with the target sample. Refer to **Appendix A and B** respectively for the final English and Arabic versions of the questionnaire.

4.5 Data Collection

This section addresses the methodology followed up by the researcher in gathering the data required for achieving study objectives. Collected data can be classified into two main categories, primary data and secondary data.

Secondary Data: are data collected by someone other than the researcher and are referred to by the researcher to address the theoretical framework and literature of the study. The following data sources were used:

1. Relevant published researches, papers, articles and previous studies.
2. Books and other references in relation with the subject of the study.
3. Publications of UNRWA and annual reports of health program.
4. Internet, electronic websites, and online dictionaries

Primary Data: are data collected directly by the researcher. In this study, the researcher made use of a questionnaire instrument to survey the target sample and investigate attitudes of respondents towards study hypotheses. It was distributed among 19 health centers across Gaza Strip to survey a target sample of at least 237 clinical staff with different titles and job characteristics. Out of the 320 questionnaire copies distributed to all health centers, only 265 copies were returned with 18 invalid copies (either not filled at all, more than 25% not filled or extreme tendency). Questionnaire sections inspected individuals' attitudes in regards with seven conceptions: Information Quality, System Quality, Perceived Ease of Use, Perceived Usefulness, User Performance, Physician-Patient Relationship and Patient Care.

Collected data were extracted from questionnaires, coded and inserted into SPSS and Smart-PLS for further statistical tests and analysis.

The researchers administered questionnaire distribution and collection process by themselves to ensure the delivery and accuracy. Table (4.3) illustrates the minimum size of needed sample per health center, the actually distributed questionnaires, the valid responses returned and rate of responses returned.

Table (4.3): Sample size per health center, questionnaires distributed & response returned

No	Health Centers	Sample Needed	Dist Ques[1]	Rtrnd Ques[2]	Rspns Rate[3]
1	Jabalia	25	38	27	71.05%
2	North-Gaza	13	18	16	88.89%
3	Shaikh-Radwan	10	15	15	100.00%
4	Rimal	20	27	22	81.48%
5	Beach	11	13	9	69.23%
6	Gaza-Town	13	14	13	92.86%
7	Sabra	12	15	13	86.67%
8	West-Nusairat	7	13	12	92.31%
9	Nusairat	15	17	9	52.94%
10	Buriej	10	12	8	66.67%
11	Maghazi	8	15	11	73.33%
12	Deir-Balah	10	15	10	66.67%
13	Japanese	8	11	8	72.73%
14	Khan-Younis	17	21	18	85.71%
15	Maen	13	15	12	80.00%
16	Naser	5	5	5	100.00%
17	Rafah	17	22	16	72.73%
18	Shaboura	8	12	7	58.33%
19	Tel Sultan	10	15	10	66.67%
20	Shouka	5	7	6	85.71%
	Total	**237**	**320**	**247**	**77.19%**

1. ***Dist Ques**: distributed questionnaires*
2. ***Rtrnd Ques**: number of valid returned questionnaire copies*
3. ***Rspns Rate**: number of valid responses per health center compared to submitted ones*

4.6 Statistical Analysis Tools

This section addresses the different statistical analysis tools and tests used to investigate reliability and validity of the proposed model and to analyze collected data and generate responses to study questions and to test study hypotheses. SPSS version 18 and Smart-PLS v 3.2.4 were utilized to run the following list of tests and describe results.

1. Cronbach's Alpha
2. Person Correlation
3. Frequency and Descriptive Analysis
4. Composite Reliability Test
5. Convergent Validity Test

6. Discriminant Validity Test
7. Fornell-Larcker Criterion test
8. Cross Loading Test
9. Collinearity Statistics (VIF)
10. Average Variance Extracted (AVE)
11. Path Coefficient test (Beta)
12. Coefficient of Determination (R^2)

4.7 Validity of the Research Instrument

Validity of a measurement instrument means that it can measure what it was originally designed for. It also proves quality and trustworthiness of the instrument. The following subsection are discussing the different techniques used by the researcher to ascertain the validity of the questionnaire utilized in this study.

4.7.1 The Experts Validation (Content Validity)

After the initial preparation of the study questionnaire, it was translated into Arabic and then presented to 9 experts with different specializations and workplaces who are known to have excellent experience in criticizing and assessing research measurement tools. They were asked to review and comment on the study questionnaire by identifying weak, ambiguous, inconsistent or contradicting paragraphs and to evaluate whether questionnaire sections do look to measure the intended variables. The questionnaire was then amended based on their recommendations and suggestions and represented to some of them for a second time to ensure correct application of advised changes.

4.7.2 Pilot (Scouting) Study Validation

At this stage, the intended questionnaire was tested for validity by selected a pilot target group of 30 individuals from 15 health centers (2 people each) compatible with study population characteristics. The pilot group were asked to respond to questionnaire paragraphs then responses were collected, encoded and injected into SPSS software for internal and structural validity investigation.

4.7.2.1 Internal (Criterion-Related) Validity

Internal validity of a questionnaire is calculated be evaluating the correlation among each of the questionnaire constructs and their related paragraphs. The researcher utilized data collected from the scouting study together with SPSS-v18 to test internal validity and calculate such correlations.

Table (4.4) illustrates the correlation coefficient for **Information Quality** construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.4): Correlation coefficient for Information Quality construct and paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
IQ1	HIS provides you with accurate information	.835**	.000
IQ2	Information contained in HIS is timely and regularly updated	.770**	.000
IQ3	HIS provides you with information that is clear and easy to understand	.712**	.000
IQ4	HIS provides you with information that is valid and reliable	.757**	.000
IQ5	HIS provides you with information that is complete and sufficiently detailed	.757**	.000
IQ6	HIS provides you with consistent information	.811**	.000
IQ7	HIS provides you with relevant information	.891**	.000
IQ8	HIS provides you with easily accessible and usable information	.716**	.000
IQ9	Data are inserted into HIS immediately	.748**	.000
IQ10	HIS stores patient data in a standard format	.715**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table (4.5) illustrates the correlation coefficient for **System Quality** construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.5): Correlation coefficient for System Quality construct and its related paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
SQ1	HIS functions well according to its purpose.	.552**	.002
SQ2	HIS is adaptable to upcoming needs of users	.748**	.000
SQ3	HIS Meets information security and privacy requirement	.681**	.000

	Paragraphs	Correlation Coefficient	P-Value (Sig)
SQ4	HIS is always up and running	.802**	.000
SQ5	HIS is fast and has timely response	.674**	.000
SQ6	HIS can be integrated with other systems in the health center	.623**	.000
SQ7	HIS makes it easier to correct your work errors	.722**	.000
SQ8	HIS helps you to reduce errors in your work.	.803**	.000
SQ9	HIS is reliable and Free from error	.714**	.000
SQ10	HIS is flexible and customizable to meet health center style of work	.713**	.000
SQ11	HIS makes it easier to prepare the required reports	.689**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table **(**4.6) illustrates the correlation coefficient for **Perceived Usefulness** construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for. Noteworthy that correlation coefficient of PU3 is very small and would be excluded from data analysis.

Table (4.6): Correlation coefficient for Perceived Usefulness construct and paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
PU1	HIS improves the quality of my work	.799**	.000
PU2	HIS allows me to have quick access to patients data	.853**	.000
PU3	HIS facilitates communication of information among various care providers	**.434***	.017
PU4	HIS assists in avoiding duplication of examinations	.676**	.000
PU5	HIS reduces the risk of error in health care service	.834**	.000
PU7	HIS gives me greater control over my work schedule	.809**	.000
PU8	HIS enhances my overall effectiveness in my job	.844**	.000
PU9	HIS makes it easier to do my job	.865**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table **(**4.7) illustrates the correlation coefficient for **Perceived Ease of Use** construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.7): Correlation coefficient for Perceived Ease of Use construct and paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
PE1	I think it is easy to learn to use HIS	.900**	.000
PE2	I think HIS is easy to use	.911**	.000
PE3	I think HIS makes my consultations with patients easier	.739**	.000
PE4	I think I will become skilled using HIS	.881**	.000
PE5	I think HIS will be easy for physicians to use	.898**	.000
PE6	I think it is easy to get the system do what I want it to do	.843**	.000
PE7	I think it is easy to interact with HIS (respond to pop up dialogs and system instructions, supply input needed to some processes execution or report generation)	.773**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table **(**4.8) illustrates the correlation coefficient for Performance construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.8): Correlation coefficient for Performance construct and its related paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
PF1	I can do large amount of work	.801**	.000
PF2	I can accomplish work assigned to me which usually exceeds my duties	.795**	.000
PF3	I can solve my work problems easily	.874**	.000
PF4	I hardly ever make mistakes in work	.799**	.000
PF5	I follow proper procedures in solving problems at work environment	.911**	.000
PF6	I accomplish assigned tasks effectively and efficiently	.769**	.000
PF7	I accomplish assigned tasks quickly and accurately	.788**	.000
PF8	I communicate gently with my colleagues and others	.615**	.000
PF9	I do effectively coordinated work with my colleagues	.753**	.000
PF10	I create new ideas that simplify performing my work	.642**	.000
PF11	I work on achieving my employment goals and on developing my career path	.750**	.000
PF12	I constantly work on improving the quality of my performance	.614**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table **(**4.9) illustrates the correlation coefficient for Patient Care construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.9): Correlation coefficient for Patient Care construct and its related paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
PC1	Quality of medical care received by the patients is high	.667**	.000
PC2	Cost of patient care is relatively low	.721**	.000
PC3	Patient waiting time is relatively short	.682**	.000
PC4	Errors in laboratory tests hardly ever happens	.749**	.000
PC5	Patient information are treated securely	.505**	.004

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table **(**4.10) illustrates the correlation coefficient for Doctor-Patient Relationship construct and its related paragraphs. The p-values are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$. Therefore, it can be said that the paragraphs of this field are consistent and valid to measure what it was set for.

Table (4.10): Correlation coeff. for Doctor-Patient Relationship construct & paragraphs

	Paragraphs	Correlation Coefficient	P-Value (Sig)
DP1	Patients have high confidence in physicians	.880**	.000
DP2	Doctors have high credibility with patients	.854**	.000
DP3	Patients are more satisfied with the received medical service	.650**	.000
DP4	Doctors have positive and effective interaction with patients	.840**	.000
DP5	Patients increasingly participate in the development of their treatment plan	.687**	.000
DP6	The language and terminology used by the doctor with his patient commensurate with the cognitive level of the patient	.814**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

4.7.2.2 Structure Validity

Structure validity of a questionnaire is another statistical test to validate a questionnaire measurement instrument. It is calculated by evaluating the correlation among each of the questionnaire constructs and the whole of questionnaire. The

researcher utilized data collected from the scouting study together with SPSS-v18 to test questionnaire structure validity and calculate needed correlations.

Table **(**4.11) illustrates the correlation coefficients between constructs and the whole of the questionnaire. The p-values are less than 0.05, therefore, the correlation coefficients of all the constructs are significant at $\alpha = 0.05$ and hence, it is concluded that all constructs are valid to measure what they were set to measure.

Table (4.11): Correlation coefficients between constructs and whole of questionnaire

Constructs		Correlation Coefficient	P-Value (Sig)
IQ_Mean	Information Quality	.889**	.000
SQ_Mean	System Quality	.897**	.000
PU_Mean	Perceived Usefulness	.896**	.000
PE_Mean	Perceived Ease of Use	.923**	.000
PF_Mean	Performance	.899**	.000
PC_Mean	Patient Care	.747**	.000
DP_Mean	Doctor Patient Relationship	.715**	.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

4.8 Reliability of the Research Instrument

Reliability of a measuring instrument is its ability to create reproducible results, meaning that similar scores should be obtained each time it is used. Hence, a questionnaire is said to be reliable if similar answers are produced repeatedly. A questionnaire cab be reliable but invalid, yet a valid one is always reliable. Reliability can be statistically measured by using Cronbach's Coefficient (Alpha).

4.8.1 Cronbach's Coefficient (Alpha)

Cronbach's alpha is a measure of internal consistency that measures the level of relationship among items in one group. It is considered to be a measure of scale reliability. It ranges from 0 to 1 and a higher value of alpha indicates a higher consistency and reliability and consequently the different items in the group are closely related. The researcher made used of this coefficient to investigate the reliability of the instrument used in this study by inspecting how closely the different constructs of the questionnaire relate to the questionnaire as a whole. Table **(**4.12) illustrates the calculated values of Cronbach's coefficient (Alpha) for each construct and for the

whole questionnaire. Alpha values range from .669 to .934 which is taken to be acceptable Cronbach's coefficient values. The overall alpha value for the whole questionnaire was found to be .977 which is considered as very high and indicates very high reliability and internal consistency. Having this excellent outcome for validity and reliability tests, the researcher has proved dependability on the study instrument and will rely on it to measure the study variable.

Table (4.12): Calculated values of Cronbach‘s Alpha for constructs and questionnaire

	Construct	No of Items	Cronbach's Alpha
1	Information Quality	10	.923
2	System Quality	11	.895
3	Perceived Usefulness	8	.893
4	Perceived Ease of Use	7	.934
5	Performance	12	.931
6	Patient Care	5	.669
7	Doctor Patient Relationship	6	.865
	All Paragraphs	**59**	**.977**

4.9 Chapter Summary

This chapter discussed and elaborated on the research design and methodology followed by the researcher in conducting this study. It also expanded on study population and sample and illustrated tools and instruments used in data gathering. Questionnaire design was presented in details and investigation on questionnaire validity and reliability were also thoroughly discussed.

Chapter Five
Data Analysis and Results

Chapter Five: Data Analysis and Results

5.1 Introduction

This chapter addresses the different phases of data analysis. It explains responses of the target population and expands on the outcome of the data analysis. Variance in respondents' demographics is also described. SPSS v18 and Smart-PLS v3.2 were used to analyze data and to examine the relationships among study variables based on the research model. The researcher will firstly go over the similarities and difference in the demographic information of the sample individuals, then statistical analysis on the collected data will be performed to answer study questions. Finally, study hypotheses will be tested and compared with previous studies.

5.2 Demographic Characteristics of the Sample

5.2.1 Age:

Table **(**5.1) illustrates respondents variation based on age classification. The researcher has categorized ages into four groups, each of which spans 10 years of age. Group-1 included ages less than 30, group-2 included ages from 30 to less than 40 and likewise group-3 included ages from 40 to less than 50 while group-4 covered ages of 50 and above. Analysis of the sample shows that the highest percentage (39.27%) belongs to respondents from 30 to near 40 years in age while the second highest (23.48) refers to respondents from 40 to near 50 years. The other two groups have very similar percentages with less than 1% discrepancy. This analysis conclude that the two extremes of most young (less than 30 years old) and the most old (50 years old and above) clinical staff members make up a small portion of the sample, less than 20% each and less than 40% in total while more than 62.5% of the sample represents staff members from 30 to almost 50 years in age.

Table (5.1): Distribution of Sample members based on Age classes

Age Class	Frequency	Percent
Less than 30	45	18.22%
From 30 to 39	97	39.27%
From 40 to 49	58	23.48%
50 or more	47	19.03%
Total	**247**	**100.00%**

5.2.2 Gender:

Analysis of gender distribution of study respondents resulted in the fact that females form 65.2% of the sample size while male form only 34.8%. This means that UNRWA health centers are occupied by female staff members twice as many as males. This could be due to the nature of work at primary care health centers where midwifes and nurses are mostly females. It could also be due to the recent policies adopted by UNRWA for raising the number of working women in its areas of operations by imposing them to special empowerment training programs and giving them higher opportunities to work for UNRWA. Table **(**5.2) illustrates the distributions of sample individuals into Gender groups.

Table (5.2): Distribution of Sample members based on Gender classes

Sex	Frequency	Percent
Female	161	65.2%
Male	86	34.8%
Total	**247**	**100.0%**

5.2.3 Experience:

Table **(**5.3) illustrates respondents variation based on number of years of experience. The researcher has categorized years of experience into five groups, each of which spans 5 years period. Group-1 spans from zero to right before 5, group-2 spans from 5 to right before 10, and likewise group-3 spans from 10 to right before 15, group-4 spans from 15 to right before 20. Finally, group-5 covered experience of 20 years and above. Analysis of the sample showed that the highest percentage (24.70%) belongs to respondents with more than 20 years of experience while the lowest rate (11.74%) was for respondents with 16 to 20 years. Fresh graduates with less than 5 years of experience is also as high in rate as (22.67%), a similar rate (23.08%) was concluded for those with 6 to 10 years of experience. Respondents with 11 to 15 years of experience had rate of (17.81%) which is not very high. It could be concluded that UNRWA preserves its highly experienced staff members or they find UNRWA a great place for work, and this what made their rate the highest among UNRWA-health center staff members. UNRWA also seems to provide high opportunities to attract and recruit new graduates

with fresh minds and high potential, which made their rate very close to that of old experienced staff members. This comes in line with the recent employment policy adopted by UNRWA in relying on limited duration contracts (LDC) and special service agreements instead of fix term and permanent jobs.

Table (5.3): Distribution of Sample members based on Years of Experience

Years of Experience	Frequency	Percent
Less than 5	56	22.67%
From 5 to <10	57	23.08%
From 10 to <15	44	17.81%
From 15 to <20	29	11.74%
20 or More	61	24.70%
Total	**247**	**100.00%**

5.2.4 Specialization:

Specialization of the health center personnel is classified into four main groups: Specialists, General Physician, Medical Support Personnel, and Admin staff. Specialist include cardiologist, ophthalmologist, psychiatrist, physiotherapist and dentist. Medical Support Personnel include staff nurse, midwife, NCD nurse, laboratory technician, and pharmacist. Admin staff is any personnel who is not involved in patient treatment such as general clerk and NCD clerk. Analysis of the study sample revealed that more than half of the sample individuals (51.8%) are medical support personnel and almost one third of the sample are general doctors. Specialists are rare and form 9.3% of the sample size. Similarly, admin staff formed only 8.5% of the sample. This distribution is highly rational as UNRWA health centers treats only outpatients and provides solely primary care service which is usually attended to by general doctors and staff nurse. For cases that need secondary or tertiary intervention, UNRWA refers such cases to other private or public hospitals or care centers for further treatments. Table **(**5.4) illustrates specialization distribution in the study sample.

Table (5.4): Distribution of Sample members based on Specialization classes

Specialization	Frequency	Percent
Specialist	23	9.3%
General Doctor	75	30.4%
Medical Support	128	51.8%
Admin	21	8.5%
Total	**247**	**100.0%**

5.2.5 IT background:

Information Technology background inspects the knowledge of respondents regarding computer usage and technology awareness and their skills in dealing with new applications, those who have high IT knowledge and classified as good IT users are anticipated to accept, learn and use the newly adopted e-health system faster and to utilize it more compared to those who have poor background in IT. Analysis of sample data concluded that the majority of respondents (53.4%) had good IT background, other (34.8%) had fair IT knowledge where only (11.7%) classified themselves as poor in IT or have no good IT background. This indicates that health centers' staff have high potential to smoothly get adapted with the system and to dig deep to extract its treasures. They are also anticipated to criticize the system and recommend enhancements which would make life easier at UNRWA health centers. High IT knowledge of staff member also reflects the attention paid by the management in developing the staff and building their capacities. Table **(**5.5) illustrates specialization distribution in the study sample.

Table (5.5): Distribution of Sample members based on IT Background classes

IT Background	Frequency	Percent
Poor	29	11.7%
Fair	86	34.8%
Good	132	53.4%
Total	**247**	**100.0%**

5.3 Investigating and Answering Research Questions

In this section the researcher addresses and evaluates of respondents' attitudes towards study variables. T-test is used to calculate the means of the sample responses for all paragraphs in each construct separately and test whether these means significantly equal to the hypothesized mean of the population which is proposed to be equal to the mean of the used scale, namely equal to 4.

5.3.1 Classification of Mean:

The scale used on this study was a 7-degree Likert scale that has 6 intervals. These intervals are put into 3 main classes for easier response interpretation. A mean value that falls in the first two intervals is classified as poor or low where a mean values that falls in the third and fourth intervals is classified as moderate. And finally,

a mean value that falls in the last two intervals is classified as high. Table **(**5.6) illustrates the distribution of Mean values into one of the agreement classes.

Table (5.6): Distribution of Mean values into one of the agreement classes

Mean Range	Agreement Class	Description
[1-3]	Low	Mean fall between 1 and 3 inclusive
]3,5]	Moderate	Mean is more than 3 and less than or equal to 5
]5,7]	High	Mean is more than 5 and less than or equal to 7

5.3.2 Attitudes towards Information Quality:

RQ1*: How did respondents evaluate the quality of the information inserted into or generated from the implemented e-health system?*

Table **(**5.7) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the information quality construct.

Table (5.7): Attitudes of respondents towards the information quality of HIS system

	Paragraph	Mean	Mean* (%)	t-test value	P-Value (Sig)	Rank
IQ1	HIS provides you with accurate information	5.794	82.77%	23.751	.000	2
IQ2	Information contained in HIS is timely and regularly updated	5.196	74.23%	12.190	.000	10
IQ3	HIS provides you with information that is clear and easy to understand	5.794	82.77%	25.505	.000	1
IQ4	HIS provides you with information that is valid and reliable	5.660	80.86%	19.979	.000	4
IQ5	HIS provides you with information that is complete and sufficiently detailed	5.381	76.87%	15.968	.000	9
IQ6	HIS provides you with consistent information	5.385	76.93%	18.232	.000	8
IQ7	HIS provides you with relevant information	5.555	79.36%	19.530	.000	7
IQ8	HIS provides you with easily accessible and usable information	5.700	81.43%	19.763	.000	3
IQ9	Data are inserted into HIS immediately	5.617	80.24%	18.455	.000	6
IQ10	HIS stores patient data in a standard format	5.625	80.36%	19.327	.000	5
	All Paragraphs	**5.568**	**79.54%**	**24.342**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole are all above 5, this means that respondents, generally, highly agreed to all paragraphs of information quality and confirm that e-health system retain high quality of information with *high* agreement ranged from 5.196 (74.23%) to 5.794 (82.77%) with overall mean of 5.568 (79.54%). (IQ3) "*Clear and easy to understand*" and (IQ1) "*Information is accurate*" got the highest rank where (IQ2) "*information is timely and regularly updated*" got the lowest rank.

5.3.3 Attitudes towards System Quality:

RQ2*: How did respondents evaluate the quality of the implemented e-health system?*

Table **(**5.8) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the system quality construct. By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. This means that respondents, generally, agreed (highly or moderately) to all paragraphs of system quality construct and confirm that the e-health system as a whole retain high system quality with agreement means ranged from 4.563 (65.19%) to 5.700 (81.43%) and overall mean of 5.177 (73.96%). (SQ11) "*HIS makes it easier to prepare the required reports*" got the highest rank followed by (SQ1) "*HIS functions well according to its purpose*" where (SQ4) "*HIS is always up and running*" got the lowest rank and (SQ5) "*HIS is fast and has timely response*" was ranked right before the last. (SQ4) and (SQ5) being ranked the lowest and have mean rate less than 70.00% indicate that the system is not as fast or available as it should be and that enhancement in this side is necessary. This could be attributed to internet connectivity issues, as users connect to

FHT system using internet connection that is currently being shared with other UNRWA services and internet surfing. Therefore, when internet link is saturated or has issues, access to FHT system is highly affected. One other possible reason is that health centers are connected to Gaza Field office using wireless link that transmits on free frequency bands. The high trend towards using wireless connectivity in Gaza and the absence of controlling policies resulted in high traffic congestion in these bands and in turn frequent signal distortion and link failure. Analysis also showed moderate agreement with mean rate less than 70.00% to (SQ7) "*HIS makes it easier to correct your work errors*" and (SQ9) "*HIS is reliable and free from error*" that address error correction and error avoidance capabilities of the system and this moderate agreement could be attributed to that fact that the system is still under development and not yet mature and users continuously report system errors to the developer to fix.

Table (5.8): Attitudes of respondents towards the system quality of HIS system

	Paragraph	Mean	Mean* (%)	t-test	P-Value (Sig)	Rank
SQ1	HIS functions well according to its purpose.	5.490	78.43%	17.926	.000	2
SQ2	HIS is adaptable to upcoming needs of users	5.433	77.61%	18.450	.000	3
SQ3	HIS Meets information security and privacy requirement	5.417	77.39%	15.527	.000	4
SQ4	HIS is always up and running	**4.563**	**65.19%**	5.301	.000	11
SQ5	HIS is fast and has timely response	**4.765**	**68.07%**	7.634	.000	10
SQ6	HIS can be integrated with other systems in the health center	5.117	73.10%	11.382	.000	7
SQ7	HIS makes it easier to correct your work errors	**4.911**	**70.16%**	9.574	.000	8
SQ8	HIS helps you to reduce errors in your work.	5.352	76.46%	15.177	.000	6
SQ9	HIS is reliable and Free from error	**4.794**	**68.49%**	7.853	.000	9
SQ10	HIS is flexible and customizable to meet health center style of work	5.405	77.21%	17.637	.000	5
SQ11	HIS makes it easier to prepare the required reports	5.700	81.43%	18.824	.000	1
	All Paragraphs	**5.177**	**73.96%**	**17.464**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

5.3.4 Attitudes towards Perceived Usefulness:

***RQ3**: How did respondents perceive the usefulness of the implemented e-health system?*

Table **(**5.9) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the perceived usefulness construct. By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole are all above 5, this means that respondents, generally, highly agreed to all paragraphs of system perceived usefulness and confirm that they have high perception that system is useful and will assist them accomplishing their work more effectively and more efficiently. Mean responses ranged from 5.105 (72.93%) to 5.798 (82.83%) and overall mean of 5.484 (78.34%). (PU4) "*HIS assists in avoiding duplication of examinations*" got the highest rank where (PU3) "*HIS facilitates communication of information among various care providers*" scored the lowest rank and this could be attributed to the fact that the current system does not yet share information with other providers, although planed, but the respondents anticipated that such a great system must have such a facility.

Table (5.9): Attitudes of respondents towards the perceived usefulness of HIS system

	Paragraph	Mean	Mean* (%)	t-test	P-Value (Sig)	Rank
PU1	HIS improves the quality of my work	5.575	79.64%	19.402	.000	3
PU2	HIS allows me to have quick access to patients data	5.741	82.01%	22.635	.000	2
PU3	HIS facilitates communication of information among various care providers	5.105	72.93%	10.201	.000	8
PU4	HIS assists in avoiding duplication of examinations	5.798	82.83%	20.485	.000	1
PU5	HIS reduces the risk of error in health care service	5.518	78.83%	18.910	.000	4
PU6	HIS gives me greater control over my work schedule	5.283	75.47%	14.407	.000	7
PU7	HIS enhances my overall effectiveness in my job	5.433	77.61%	16.716	.000	5
PU8	HIS makes it easier to do my job	5.417	77.39%	15.229	.000	6
	All Paragraphs	**5.484**	**78.34%**	**22.405**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

5.3.5 Attitudes towards Perceived Ease of Use:

RQ4*: How did respondents perceive the ease of use of the implemented e-health system?*

Table **(**5.10) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the perceived ease of use construct. By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole are all above 5, this means that respondents, generally, highly agreed to all paragraphs of system perceived ease of use construct and confirm that they have high perception that system is easy to use and easy to learn and will assist them to easily accomplishing their work. Mean responses ranged from 5.389 (76.99%) to 6.085 (86.93%) and overall mean of 5.710 (81.57%). (PE1) "*I think I will become skilled using HIS*" got the highest rank where (PE6) "*I think it is easy to get the system do what I want it to do*" and (PE7) "*I think it is easy to interact with HIS*" got the lowest rank.

Table (5.10): Attitudes of respondents towards the perceived ease of use of HIS system

	Paragraph	Mean	Mean* (%)	t-test	P-Value (Sig)	Rank
PE1	I think it is easy to learn to use HIS	5.818	83.11%	24.637	.000	3
PE2	I think HIS is easy to use	5.785	82.64%	23.742	.000	4
PE3	I think HIS makes my consultations with patients easier	5.636	80.51%	22.709	.000	5
PE4	I think I will become skilled using HIS	6.085	86.93%	32.046	.000	1
PE5	I think HIS will be easy for physicians to use	5.866	83.80%	26.105	.000	2
PE6	I think it is easy to get the system do what I want it to do	5.389#	76.99%	17.016	.000	6
PE7	I think it is easy to interact with HIS	5.389#	76.99%	15.453	.000	7
	All Paragraphs	**5.710**	**81.57%**	**28.853**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale
\# SD for PE6=1.283 where SD for PE7 is 1.412

5.3.6 Attitudes towards User Performance:

RQ5*: How did respondents evaluate their own performance?*

Table **(**5.11) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the user performance construct.

Table (5.11): Attitudes of respondents towards their own performance

	Paragraph	Mean	Mean* (%)	t-test	P-Value (Sig)	Rank
PF1	I can do large amount of work	5.328	76.11%	14.632	.000	10
PF2	I can accomplish work assigned to me which usually exceeds my duties	**4.911**	**70.16%**	8.780	.000	12
PF3	I can solve my work problems easily	5.069	72.41%	11.578	.000	11
PF4	I hardly ever make mistakes in work	5.611	80.16%	20.686	.000	9
PF5	I follow proper procedures in solving problems at work environment	5.692	81.31%	23.901	.000	8
PF6	I accomplish assigned tasks effectively and efficiently	6.089	86.99%	32.057	.000	4
PF7	I accomplish assigned tasks quickly and accurately	5.992	85.60%	29.882	.000	5
PF8	I communicate gently with my colleagues and others	6.162	88.03%	32.705	.000	2
PF9	I do effectively coordinated work with my colleagues	6.134	87.63%	32.833	.000	3
PF10	I create new ideas that simplify performing my work	5.806	82.94%	24.115	.000	7
PF11	I work on achieving my employment goals and on developing my career path	5.935	84.79%	26.879	.000	6
PF12	I constantly work on improving the quality of my performance	6.211	88.73%	34.254	.000	1
	All Paragraphs	**5.745**	**82.07%**	**31.501**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole except (PF2) are all above 5, this means that respondents, generally, highly agreed to most of the paragraphs of user performance construct and confirm that they have high user job performance. Mean responses

ranged from 4.911 (70.16%) to 6.211 (88.73%) and overall mean of 5.745 (82.07%). (PF12) "*I constantly work on improving quality of my performance*" got the highest rank where (PF2) "*I can accomplish work assigned to me which usually exceeds my duties*" got the lowest rank. The moderate agreement of respondents to (PF2) could be attributed to the nature of work at the very crowded UNRWA health centers which result in staff full time engagement. Therefore, extra work that is out of regular duties is not usually welcomed.

5.3.7 Attitudes towards Patient Care:

RQ6*: How did respondents evaluate patient care?*

Table **(**5.12) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the patient care construct.

Table (5.12): Attitudes of respondents towards the patient care

	Paragraph	Mean	Mean* (%)	t-test	Sig (2-tailed)	Rank
PC1	Quality of medical care received by the patients is high	5.510	78.71%	19.792	.000	2
PC2	Cost of patient care is relatively low	5.077	72.53%	9.342	.000	4
PC3	Patient waiting time is relatively short	**4.555**	**65.07%**	5.262	.000	5
PC4	Errors in laboratory tests hardly ever happens	5.231	74.73%	13.205	.000	3
PC5	Patient information are treated securely	5.587	79.81%	16.744	.000	1
	All Paragraphs	**5.192**	**74.17%**	**17.915**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole except (PC3) are all above 5, this means that respondents, generally, highly agreed to most of the paragraphs of patient care

construct and confirm that patient care is of high quality. Mean responses ranged from 4.555 (65.07%) to 5.587 (79.81%) and overall mean of 5.192 (74.17%). (PC5) "*Patient information are treated securely*" got the highest rank where (PC3) "*Patient waiting time is relatively short*" got the lowest rank. The moderate agreement of respondents to (PC3) could be attributed to the high demand on UNRWA free-of-charge health centers by the refugees and the limitation in human resources and medical staff work for UNRWA.

5.3.8 Attitudes towards Physician-Patient Relationship:

RQ7*: How did respondents evaluate the relationship between physicians and their patient?*

Table **(**5.13) illustrates the calculated mean, mean percent, t-test value and the significance (p-value) of the test for each and every paragraph used to evaluate attitudes of respondents towards the physician-patient relationship construct. By looking at p-values of all paragraphs, it is apparent that all paragraphs have p-value =.000 which is less than the level of significance of $\alpha = 0.05$. This means that null hypothesis of mean=4 is rejected and the alternate hypothesis of mean $\neq 4$ is accepted. Also, all t-test values are positive and all means are greater than 4, hence, all paragraphs have statistically significant means above the hypothesized value of 4 at the level of significance of $\alpha = 0.05$. Mean values for all paragraphs and the overall mean of the construct as a whole except (DP1 and DP5) are all above 5, this means that respondents, generally, highly agreed to most of the paragraphs of physician-patient relationship construct and confirm that there is high quality relationship between physicians and their patients. Mean responses ranged from 4.664 (66.63%) to 5.522 (78.89%) and overall mean of 5.178 (73.97%). (DP6) "*The language and terminology used by the doctor with his patient commensurate with the cognitive level of the patient*" got the highest rank where (DP5) "*Patients increasingly participate in the development of their treatment plan*" got the lowest rank. (DP1) "*Patients have high confidence in physicians*" was ranked right before the last with mean=4.964 and t-test value of 11.499. The moderate agreement of respondents to (DP5) could be attributed to the fact that patients do not yet have access to their medical records (although planed), and they lack information about their cases thus, they cannot effectively participate in putting treatment plans. In addition, absence or degradation of confidence in physicians (DP1)

can be attributed to the large number of medical errors and medical injuries as a result of the high pressure on medical staff especially during crisis and wars due to the unstable political environment of Gaza Strip and the lack of medicines and pharmaceuticals due to the continuous blockade and the shortage in specialized medical staff.

Table (5.13): Attitudes of respondents towards doctor-patient relationship

56	Paragraph	Mean	Mean* (%)	t-test	Sig (2-tailed)	Rank
DP1	Patients have high confidence in physicians	**4.964**	**70.91%**	11.499	.000	5
DP2	Doctors have high credibility with patients	5.405	77.21%	17.637	.000	2
DP3	Patients are more satisfied with the received medical service	5.154	73.63%	13.843	.000	4
DP4	Doctors have positive and effective interaction with patients	5.360	76.57%	17.699	.000	3
DP5	Patients increasingly participate in the development of their treatment plan	**4.664**	**66.63%**	7.431	.000	6
DP6	The language and terminology used by the doctor with his patient commensurate with the cognitive level of the patient	5.522	78.89%	20.923	.000	1
	All Paragraphs	**5.178**	**73.97%**	**18.827**	**.000**	

* Mean (%): is calculated as mean/7 where 7 is the upper boundary of the used scale

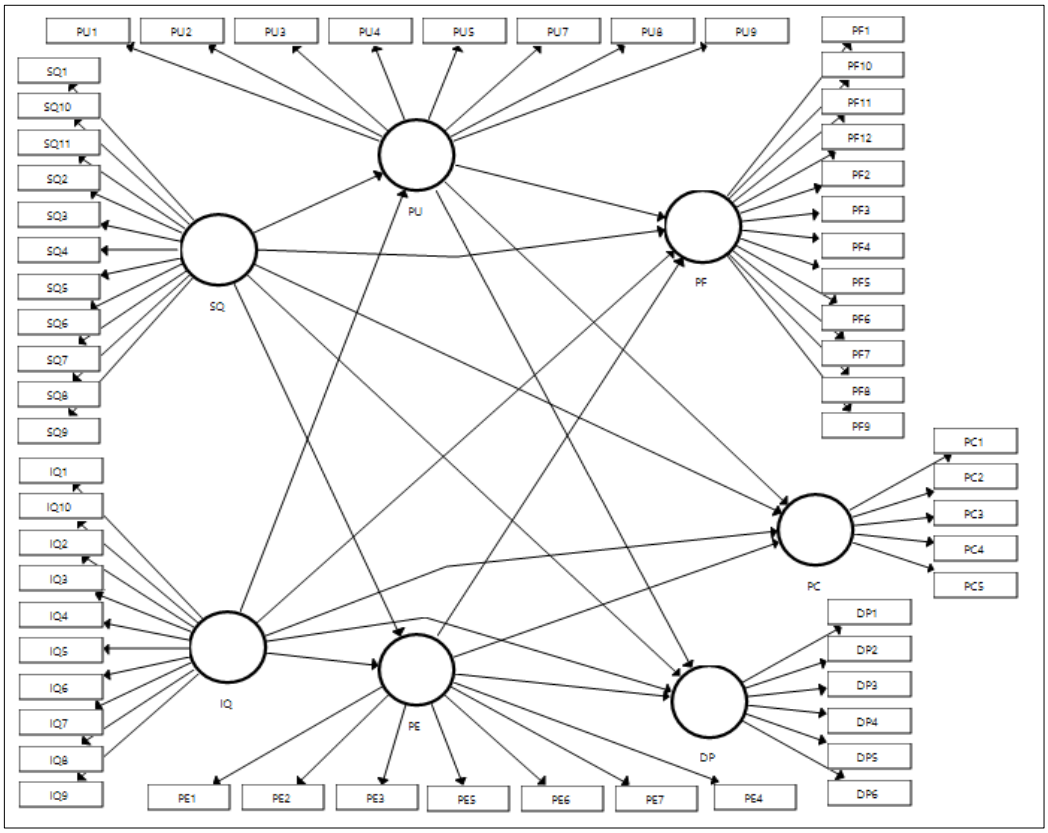
5.4 Testing Model Validity and Reliability

This section addresses the research hypotheses by analyzing collected data using the Partial Least Squares/Structural Equation Modeling (PLS/SEM). This modeling technique is a very strong tool that is getting more and more popular in the realm of social science research for its capabilities of testing theories and concepts and its abilities to evaluate the measurement of latent variables and the relationships among them **(F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014)**. This technique works much like a multiple regression analysis and uses iterative approach to maximize the variance of dependent variables, the thing that made it vital for researchers especially in exploratory studies **(F. Hair Jr et al., 2014)**. The PLS/SEM technique is mostly used by researchers when sample size is small, data do not follow normal distribution or when the studied model comprises formative constructs (constructs shaped by effects of their indicators) as PLS/SEM operates very well under these limitations **(Ringle, Sarstedt, & Straub, 2012)**. The researcher tends to use this tool to investigate the model proposed in this study and to inspect study hypotheses. To do so, analysis has to go through a multiple-stage process starting with model specification,

followed by outer (sometimes called measurement) model evaluation and ending with inner (sometimes called structural) model evaluation. The researcher used a one month trial version of Smart-PLS v3.2.6 software to analyze the data.

5.4.1 Stage-1: Model Specification

At this stage, the researcher used the model builder of Smart-PLS software to construct both the outer (measurement) and the inner (structural) models. The outer model was created by adding one latent construct to represent each and every variable in the proposed research model and all variable measures were added to their respective variables as reflective indicators (construct points to indicators as indicators are caused by the construct). Next the inner model was constructed by creating a path model that connects variables and constructs based on study theory and hypotheses. Figure (5.1) illustrates the model built at Smart-PLS software.



***IQ**: Information Quality, **SQ**: System Quality, **PU**: Perceived Usefulness, **PE**: Perceived Ease of Use, **PF**: Performance, **DP**: Doctor Patient Relationship, **PC**: Patient Care*

Figure (5.1): Research model as built at Smart-PLS v3.2.6 software

5.4.2 Stage-2: Outer (Measurement) Model Evaluation

At this stage, the outer model is assessed by executing the PLS/SEM algorithm which runs many internal calculations and generates a set of comprehensive reports. Reviewing these reports, the validity and reliability of the constructs' measures/indicators must be assured. The researcher should firstly use the composite reliability equation to measure the internal consistency reliability of the constructs. Cronbach's alpha is normally used for this, however, composite reliability is more appropriate for the reasons that it assumes equal initial loadings for all indicators and it avoids the underestimation usually associated with Cronbach's alpha (F. Hair Jr et al., 2014). The second step is to evaluate the validity of the indicators by checking convergent and discriminant validities. Convergent and discriminant validities are both considered subtypes of construct validity. Evidence for both validities must be demonstrated for establishing evidence for construct validity, neither one alone is sufficient. Convergent validity stands for the extent to which indicators of constructs are related to each other and is highly supported when each indicator has outer loadings above 0.70 and average variance extracted (AVE) value of at least 0.5 (Afthanorhan, 2013). Average variance extracted (AVE) stands for the grand mean value of the squared loadings of a set of indicators and is supported for 0.50 or higher (Afthanorhan, 2013). Discriminant validity represents the extent to which a construct is empirically distinct from other constructs and that it measures what it is intended to measure. One way to measure it is by using the *Fornell and Larcker* criterion and checking whether each construct has higher variance with its indicators compared to variances with other construct. Discriminant validity can also be examined by checking the cross loadings of the indicators. Using the latter technique, the researcher must make sure that loadings of each indicator on its construct are higher than the cross loadings on other constructs.

5.4.2.1 Internal Consistency Reliability Check

The first test for outer model evaluation is to inspect the internal consistency reliability of each construct. Internal consistency reliability judges how well the indicators connected to one construct and are proposed to measure the same conception do really produce similar results. As mentioned above, Cronbach's alpha is normally used for this purpose, however, composite reliability is a better measuring tool as it is more appropriate and more accurate. Thus, the researcher used both tests to investigate

the aim reliability. Acceptable values of both Cronbach's alpha and composite reliability should be at least 0.70 (Afthanorhan, 2013).

Table (5.14) illustrates both Cronbach's alpha and composite reliability test results. It is very obvious that all values of both tests are above the accepted threshold which ascertains internal consistency reliability of all constructs. Noteworthy that all values of composite reliability are higher than these of Cronbach's alpha.

Table (5.14): Cronbach's Alpha and composite reliability test results

Construct Names		Cronbach's Alpha	Composite Reliability
Information Quality	IQ	0.929	0.940
System Quality	SQ	0.898	0.919
Perceived Usefulness	PU	0.905	0.927
Perceived Ease of Use	PE	0.896	0.918
Performance	PF	0.928	0.940
Patient Care	PC	0.760	0.847
Doctor-Patient Relationship	DP	0.873	0.913

Acceptable values for both tests are 0.70 or more

5.4.2.2 Indicator Reliability Check

After checking the internal consistency reliability of all constructs, it is time to test the indicator/measures reliability. Indicator reliability can be investigated by computing indicators' outer loadings. A factor loading is a supposed causal effect of a latent variable (construct) on an observed indicator, or simply, the correlation between both. Loadings have to be checked for values equal to 0.70 or more. As mentioned before, values above or equal to 0.5 are still satisfactory but for highly valid outer model, 0.70 is much more favorable. Executing the PLS algorithm and checking the outer loadings report resulted in dropping 12 indicators with loadings less than 0.70 out of original 59 indicators leaving 47 indicators with loadings ranged from 0.703 to 0.874 comprised in the model analysis. Table (5.15) illustrates the number of indicators dropped from each construct, where Table (5.16) lists the loadings of all included indicators.

Table (5.15): Number of indicators dropped from each construct

Construct	Number of Indicators			
	Original	**Dropped**		**Included**
IQ	10	0	-	10
SQ	11	4	SQ3, SQ4, SQ6 SQ11	7
PU	8	2	PU3, PU4	6
PE	7	0	-	7
PF	12	3	PF1, PF2, PF3	9
PC	5	1	PC2	4
DP	6	2	DP5, DP6	4
Totals	**59**	**12**		**47**

IQ: Information Quality, **SQ**: System Quality, **PU**: Perceived Usefulness, **PF**: Performance
PE: Perceived Ease of Use, **DP**: Doctor Patient Relationship, **PC**: Patient Care

Table (5.16): Lists all included indicators and their loading values

Construct	Indicator	Loadings
IQ	IQ1	0.781
	IQ2	0.746
	IQ3	0.838
	IQ4	0.846
	IQ5	0.797
	IQ6	0.715
	IQ7	0.837
	IQ8	0.791
	IQ9	0.760
	IQ10	**0.703**
SQ	SQ1	0.794
	SQ2	0.797
	SQ5	0.773
	SQ7	0.759
	SQ8	0.772
	SQ9	0.781
	SQ10	0.831
PU	PU1	0.832
	PU2	0.792
	PU5	0.796
	PU6	0.825
	PU7	0.839
	PU8	0.854
PF	PF4	0.723
	PF5	0.820
	PF6	0.872
	PF7	0.833
	PF8	0.779
	PF9	0.799
	PF10	0.774
	PF11	0.733
	PF12	0.836
DP	DP1	0.859
	DP2	0.860
	DP3	0.809
	DP4	**0.874**
PC	PC1	0.803
	PC3	0.763
	PC4	0.758
	PC5	0.722
PE	PE1	0.794
	PE2	0.840
	PE3	0.817
	PE4	0.782
	PE5	0.770
	PE6	0.741
	PE7	0.750

IQ: Information Quality, **SQ**: System Quality, **PU**: Perceived Usefulness, **PF**: Performance,
PE: Perceived Ease of Use, **DP**: Doctor Patient Relationship, **PC**: Patient Care

5.4.2.3 Indicator Validity Check

Validity of the indicators is measured by checking both convergent and discriminant validities. When both validities are established, indicator validity is proved.

1. Convergent Validity Check

Convergent validity is measured by checking both the indicator reliability and the average variance extracted (AVE) of each construct. Indicator reliability is highly supported when each indicator has outer loadings above 0.70 and at the same time the corresponding construct has an AVE value of at least 0.50 (F. Hair Jr et al., 2014). Looking at Table (5.17), all indicator loadings are above 0.70. Thereafter, checking the AVE values generated by the execution of the PLS/SEM algorithm, all constructs' AVE values were reported above 0.5 and ranged from 0.581 to 0.724. Therefore, the necessary conditions for convergent validity were all met and convergent validity was proved. Table (5.17) shows the list of values reported for the average variance extracted (AVE) of all constructs.

Table (5.17): Average variance extracted (AVE) of all constructs

Construct Names		Average Variance Extracted (AVE)
Information Quality	IQ	0.613
System Quality	SQ	0.619
Perceived Usefulness	PU	0.678
Perceived Ease of Use	PE	0.617
Performance	PF	0.637
Patient Care	PC	0.581
Doctor-Patient Relationship	DP	0.724

Acceptable values for AVE is 0.50 or more

2. Discriminant Validity Check

Discriminant validity checks whether a construct has higher variance with its indicators compared to variances with other constructs and this can be measured using the *Fornell and Larcker* criterion which compares the square root of AVE of each construct with all correlations of other constructs. Discriminant validity of a construct is proved when the square root of AVE is higher than all other correlations with this particular construct (Afthanorhan, 2013). Discriminant validity can also be examined by checking the cross loadings of the indicators, a major cross loading would be when

at least one of the loadings of some indicator is less than 0.2 away from a loading on its primary construct (F. Hair Jr et al., 2014). Thus, to check discriminant validity using cross loading technique, loading of all constructs must be reported as 0.5 or more with their primary constructs and not less the 0.2 with other constructs. Looking at the results generated from the execution of the PLS/SEM algorithm, both techniques ensure discriminant validity of all constructs. Table (5.18) illustrates the comparison of square root of AVE values of each construct and all correlations with other constructs.

Table (5.18): Square roots of AVE of constructs vs. correlations with other constructs

	DP	**IQ**	**PC**	**PE**	**PF**	**PU**	**SQ**
DP	**0.851***						
IQ	0.371	**0.783***					
PC	0.626	0.517	**0.762***				
PE	0.443	0.547	0.498	**0.786***			
PF	0.490	0.484	0.608	0.602	**0.798***		
PU	0.385	0.718	0.558	0.684	0.537	**0.823***	
SQ	0.376	0.768	0.525	0.570	0.387	0.781	**0.787***

* Diagonal numbers are square roots of AVE while off-diagonal numbers are correlations

Table (5.19) illustrates the cross loadings report generated from the Smart-PLS software, all indicator loadings with corresponding constructs are above 0.5 and no cross loadings below 0.2 at all which again proves the discriminant validity of all constructs.

Table (5.19): Cross loadings of indicators with constructs other than their primary

	DP	**IQ**	**PC**	**PE**	**PF**	**PU**	**SQ**
DP1	0.859	0.276	0.546	0.461	0.384	0.290	0.297
DP2	0.860	0.352	0.545	0.352	0.427	0.315	0.336
DP3	0.809	0.339	0.506	0.353	0.438	0.365	0.337
DP4	0.874	0.290	0.531	0.337	0.417	0.339	0.306
IQ1	0.263	0.781	0.416	0.449	0.420	0.532	0.581
IQ2	0.271	0.746	0.347	0.406	0.350	0.529	0.624
IQ3	0.292	0.838	0.430	0.455	0.397	0.619	0.641
IQ4	0.349	0.846	0.432	0.473	0.434	0.614	0.657
IQ5	0.272	0.797	0.443	0.365	0.366	0.573	0.598
IQ6	0.235	0.715	0.413	0.419	0.353	0.538	0.553
IQ7	0.348	0.837	0.418	0.485	0.378	0.589	0.625
IQ8	0.279	0.791	0.365	0.398	0.367	0.543	0.565
IQ9	0.318	0.760	0.404	0.427	0.357	0.583	0.638
IQ10	0.261	0.703	0.376	0.395	0.361	0.482	0.521

	DP	IQ	PC	PE	PF	PU	SQ
PC1	0.595	0.455	0.803	0.464	0.605	0.533	0.436
PC3	0.413	0.361	0.763	0.324	0.345	0.372	0.353
PC4	0.427	0.368	0.758	0.374	0.381	0.364	0.413
PC5	0.444	0.380	0.722	0.335	0.483	0.407	0.390
PE1	0.334	0.384	0.354	0.794	0.450	0.454	0.373
PE2	0.340	0.456	0.418	0.840	0.491	0.524	0.440
PE3	0.409	0.557	0.422	0.817	0.529	0.670	0.560
PE4	0.387	0.363	0.387	0.782	0.537	0.425	0.352
PE5	0.285	0.338	0.340	0.770	0.402	0.471	0.392
PE6	0.285	0.451	0.357	0.741	0.442	0.599	0.460
PE7	0.371	0.420	0.441	0.750	0.439	0.575	0.520
PF4	0.305	0.365	0.469	0.448	0.723	0.417	0.328
PF5	0.383	0.522	0.482	0.548	0.820	0.564	0.438
PF6	0.440	0.467	0.514	0.535	0.872	0.476	0.355
PF7	0.395	0.376	0.446	0.488	0.833	0.444	0.285
PF8	0.453	0.316	0.473	0.430	0.779	0.342	0.241
PF9	0.460	0.376	0.479	0.429	0.799	0.385	0.246
PF10	0.357	0.328	0.500	0.458	0.774	0.405	0.249
PF11	0.308	0.259	0.494	0.425	0.733	0.333	0.211
PF12	0.421	0.386	0.519	0.520	0.836	0.424	0.350
PU1	0.340	0.679	0.482	0.539	0.471	0.832	0.654
PU2	0.301	0.705	0.433	0.576	0.443	0.792	0.655
PU5	0.318	0.570	0.510	0.570	0.437	0.796	0.661
PU6	0.304	0.518	0.446	0.536	0.378	0.825	0.658
PU7	0.285	0.513	0.401	0.554	0.404	0.839	0.589
PU8	0.349	0.534	0.472	0.599	0.509	0.854	0.632
SQ1	0.366	0.682	0.427	0.474	0.346	0.572	0.794
SQ2	0.338	0.672	0.455	0.467	0.354	0.601	0.797
SQ5	0.269	0.566	0.389	0.405	0.235	0.566	0.773
SQ7	0.206	0.525	0.371	0.402	0.227	0.559	0.759
SQ8	0.290	0.602	0.455	0.435	0.310	0.662	0.772
SQ9	0.248	0.537	0.364	0.431	0.240	0.617	0.781
SQ10	0.330	0.629	0.419	0.512	0.388	0.710	0.831

Indicators must have loadings >0.5 with their primary construct and loadings >0.2 with other constructs

5.4.3 Stage-3: Inner (Structural) Model Evaluation

At this stage, a number of steps were followed to evaluate the hypothesized relationships within the structural model. These steps assess the relationship between independent (exogenous) and dependent (endogenous) constructs. Prior to starting the

assessment procedure, inner/structural model must be tested for potential collinearity issues. Once no potential collinearity is assured, Coefficient of determination (R^2) and path coefficients calculated to inspect the quality of the proposed model and its ability to predict the dependent variables (endogenous constructs) of the study.

5.4.3.1 Collinearity Check

Collinearity is the existence of high correlation between two or more independent variables in a multiple regression model which means that at least one of the independent variables can be linearly predicted from the other variables with a high degree of accuracy. Collinearity can introduce accuracy problems and badly affect the predictability of the model. To check for collinearity, the researcher reviewed the VIF values in the Collinearity Statistics (VIF) report generated from the run of PLS/SEM algorithm. VIF value of 10 or more highly suggests potential collinearity where value below 5 suggests no potential collinearity (Hair, Ringle, & Sarstedt, 2011). The reported VIF values ranged from 1.350 to 3.162 for outer model and from 1.904 to 3.455 for inner model, the researcher concluded that potential collinearity that is likely to introduce problems in the accuracy of the model did not exist.

5.4.3.2 Coefficient of Determination (R^2) Check

Coefficient of determination (R^2) represents the proportion of the variance in the dependent variable that can be explained by the combined independent variables. Thus, it predicts the accuracy of the model. R^2 ranges from 0 to 1 with 1 representing complete predictive accuracy. R^2 With values: 0.75, 0.50, and 0.25, respectively, describe strong, fair, and weak levels of predictive accuracy (F. Hair Jr et al., 2014). For a model to be regarded as good model, all dependent variables (endogenous constructs) must have at least 0.25 as value of R^2. In a complex model like the one of this study R^2 might not be very accurate as it benefits from the additional independent variables even if the relationships are not meaningful. Hence, for complex models Adjusted R^2 is recommended. Examining the evaluation of the study model by reviewing the adjusted R square report generated from the run of PLS algorithm, all reported adjusted R^2 values for all dependent variables were above the threshold of 0.25 except for *Doctor-Patient Relationship*. Which mean the model is good in predicting model variables but may not

be as good in predicting *Doctor-Patient Relationship* construct. Table (5.20) illustrate the calculated R^2 values for all dependent variables (endogenous constructs)

Table (5.20): Calculated Adjusted-R^2 values for all dependent variables

Construct Names		Adjusted (R^2)	t-Statistics	P-Values
Doctor-Patient Relationship	DP	0.212	3.659	0.000
Patient Care	PC	0.354	5.753	0.000
Perceived Ease of Use	PE	0.347	3.746	0.000
Performance	PF	0.413	6.823	0.000
Perceived Usefulness	PU	0.640	14.959	0.000

Significance level is α =0.05 (2-tailed)

Referring to the values of adjusted R^2 in the above table and the high significance (p-values) of all constructs, it could be concluded that the model proposed by this study can explain 21.2% of the *Doctor-Patient Relationship*, 35.4% of the *Patient Care*, 34.7% of the *Perceived Ease of Use*, 41.3% of the *End User Performance*, and 64.0% of the *Perceived Usefulness*.

5.4.3.3 Path Coefficients (Beta, β)

Path coefficients are standardized versions of linear regression weights which can be used to examine an anticipated causal linkage between exogenous and endogenous variables in the structural equation modeling approach. These coefficients represent the hypothesized relationships linking dependent to independent constructs. Beta (β) values range from -1 to 1 where the sign reflects positive or negative relationship and the closer the coefficient to 1 or -1 the stronger this relation is (Hair et al., 2011). Beta (β) is regarded acceptable when its corresponding t-statistics value is 1.96 or more for significance level of alpha (α) = 0.05 and 1.65 for significance level of alpha (α) = 0.10 (Hair et al., 2011). PLS algorithm was executed with sampling bootstrapping of (10000) to calculate both path coefficients and their corresponding t-statistics values, results concluded from the test are illustrated in Table (5.21). Figure (5.2) also demonstrates the model prediction power (R^2) and the path coefficients of each path in the model.

Table (5.21): Path Coefficient (β), t-statistics and significance of each path in the model

Path	Beta Coefficients (β)	T-Statistics	P-Values	Remarks*
IQ → DP	0.111	0.897	0.370	Not Supported
IQ → PC	0.168	1.601	0.109	Not Supported
IQ → PE	**0.266**	**2.627**	**0.009**	**Supported**
IQ → PF	**0.266**	**2.583**	**0.010**	**Supported**
IQ → PU	**0.283**	**3.701**	**0.000**	**Supported**
PE → DP	**0.327**	**4.274**	**0.000**	**Supported**
PE → PC	**0.192**	**2.336**	**0.020**	**Supported**
PE → PF	**0.430**	**5.258**	**0.000**	**Supported**
PU → DP	0.000	0.004	0.997	Not Supported
PU → PC	0.214	1.780	0.075	Not Supported
PU → PF	**0.262**	**2.298**	**0.022**	**Supported**
SQ → DP	0.104	1.003	0.316	Not Supported
SQ → PC	0.119	1.189	0.234	Not Supported
SQ → PE	**0.364**	**3.843**	**0.000**	**Supported**
SQ → PF	**-0.270**	**2.364**	**0.018**	**Supported**
SQ → PU	**0.564**	**8.264**	**0.000**	**Supported**

IQ: Information Quality, **SQ**: System Quality, **PU**: Perceived Usefulness, **PF**: Performance, **PE**: Perceived Ease of Use, **DP**: Doctor Patient Relationship, **PC**: Patient Care
Significance level is α =0.05 (2-tailed)
**Path is supported when its p-value is less than 0.05 and its t-value is 1.96 or more.*

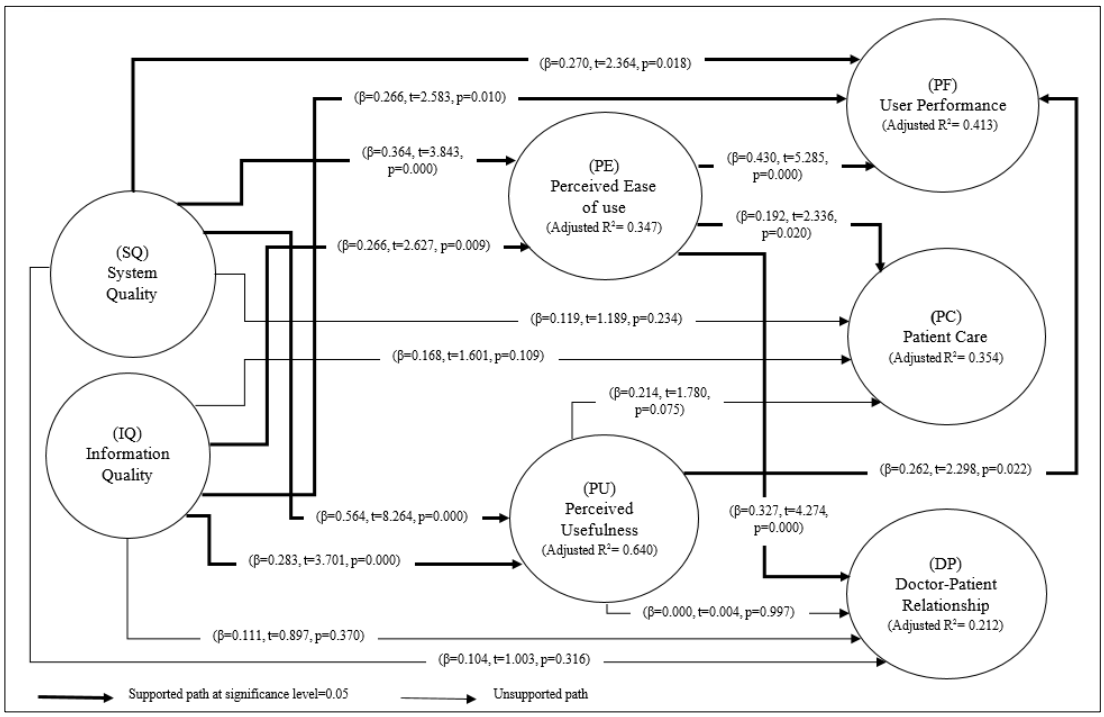


Figure (5.2): Model prediction power (R^2) & path coefficients of each path in the model

5.5 Testing Hypotheses

Based on the above statistical calculations and conclusions, this section addresses the results and conclusions of hypotheses testing. To investigate hypotheses, direct and indirect effects of exogenous (independent) constructs on endogenous (dependent) constructs have to be addressed based on the already calculated path coefficients.

Effect analysis using Smart-PLS software resulted in two effect reports, the first one is Total Effects report that reflects the total effect of each independent variable on the dependent variables as an aggregation of all path effects (direct and indirect) between both variables. The second one is Indirect Effect (Mediation) report that demonstrates the total indirect effect of each independent variable on dependent variables resulted from mediation of other factors, assuming valid mediation of all paths. Path coefficients and p-values for individual mediation paths were calculates using Goodman and Chi-Square test equations. All abovementioned tools were used to test hypotheses.

***Note**: both Total and indirect effect reports assume all paths are significant.*

Table (5.22) illustrates the **Total Effect** of independent variables on dependent variables as calculated using Smart-PLS software.

Table (5.22): Total Effect report

Path	Total Effect (β)	t-Statistics	P-Values
IQ → DP	0.198	1.753	0.040
IQ → PC	0.279	2.764	0.003
IQ → PE	0.266	2.744	0.003
IQ → PF	0.455	4.178	0.000
IQ → PU	0.283	3.824	0.000
PE → DP	0.327	4.238	0.000
PE → PC	0.192	2.379	0.009
PE → PF	0.430	5.594	0.000
PU → DP	0.000	0.004	0.498
PU → PC	0.214	1.843	0.033
PU → PF	0.262	2.298	0.022
SQ → DP	0.223	2.327	0.010
SQ → PC	0.310	3.749	0.000
SQ → PE	0.364	3.921	0.000
SQ → PF	0.034	0.342	0.366
SQ → PU	0.564	8.475	0.000

Significance level is α =0.05 (2-tailed)
Path is insignificant for t-values less than 1.96

The hereunder calculations are established using data in Table (5.22): Total Effect, and Table (5.21): Path Coefficients to check whether a statistically significant conclusion supporting study hypotheses and sub-hypotheses can be reached.

5.5.1 Hypothesis H1 Investigation

H1: Information quality of the adopted e-health system has a direct significant impact on clinicians' performance and indirect significant impact through perceived usefulness and perceived ease of use.

- **H1.a:** Information quality of the adopted e-health system has a direct significant impact on clinicians' performance.
- **H1.b:** Information quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived usefulness.
- **H1.c:** Information quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived ease of use.

Figure (5.3) is used to illustrate the direct and indirect effects of information quality on clinical staff performance, assuming mediations.

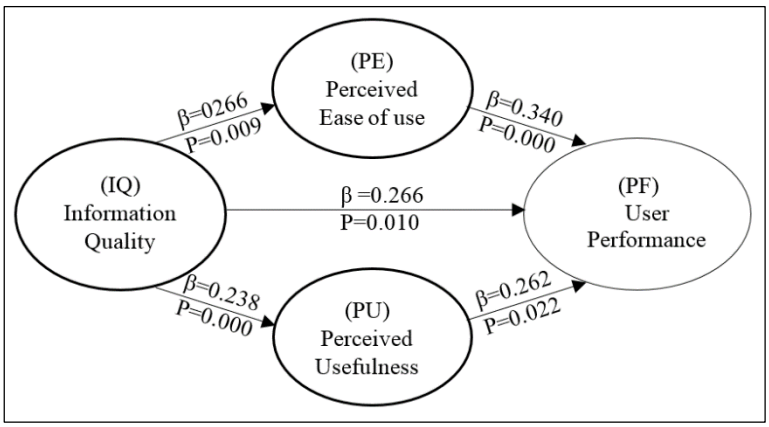


Figure (5.3): Part of study model zooming IQ→PF direct and indirect paths

Referencing Table (5.22), Total effect of IQ→PF path is (β =0.455, t=2.583, p=0.000) Referencing Table (5.21), Path coefficient of IQ→PE path is (β =0.266, t=2.627, p=0.009), Path coefficient of PE→PF path is (β =0.430, t=5.258, p=0.000), Path coefficient of IQ→PU path is (β =0.283, t=3.701, p=0.000), and Path coefficient of PU→PF path is (β =0.262, t= 2.298, p=0.022).

Indirect effect of independent variable on dependent variable due to mediation can be calculated by multiplying path coefficients of independent to mediator by path coefficient of mediator to dependent variables, i.e. indirect effect of IQ→PF due to PE mediation is 0.266 x 0.430 = (β=0.114, t=2.385, p=0.019), t-test and p-value for this mediation were calculated using **Goodman** and **Chi-Square** test equations. Similarly, indirect effect of IQ→PF due to PU mediation is 0.283 x 0.262 = (β=0.074, t=2.006, p=0.045). Total indirect effect of IQ→PF due to the combined PE and PU mediation is 0.114 + 0.074 = (β=0.188, t=3.059, p=0.001). Direct effect assuming mediation equals total effect minus mediation effect: 0.455 – 0.188 = (β=0.266, t=2.583, p=0.010) (t-test and p-value are from Table (5.21)

Validity of Hypothesis H1

From the aforementioned statistical calculations, it could be concluded that Information Quality has both direct and indirect positive influence on clinicians Performance and the indirect impact is mediated by both Perceived Usefulness and Perceived Ease of Use. Total effect of Information Quality on User Performance is reported as (β =0.455, p=0.000) which means that Information Quality has statistically significant positive direct and indirect impact on health center staff Performance at significance level of α=0.05 and it can explanation 45.5% of the variation in clinician Performance factor.

Validity of Hypothesis H1.a

The above statistical calculations emphasized that Information Quality has statistically significant positive direct impact on User Performance at significance level of α=0.05 equals to (β =0.266, p=0.010). Thus, away from the indirect impact, information quality can directly explain 26.6% of the variation in user performance which is equal to (0.266/0.455=0.585) 58.5% of the total impact.

Validity of Hypothesis H1.b

Likewise, the above statistical calculations emphasized that Information Quality has statistically significant positive indirect impact on User Performance mediated by

Perceived Usefulness at significance level of α=0.05 equals to (β =0.074, p=0.045). Thus, information quality can indirectly, through perceived usefulness, explain 7.4% of the variation in user performance which is equal to (0.074/0.455=0.163) 16.3% of the total impact.

Validity of Hypothesis H1.c

Similarly, the above statistical calculations emphasized that Information Quality has statistically significant positive indirect impact on User Performance mediated by Perceived Ease of Use at significance level of α=0.05 equals to (β =0.114, p=0.019). Thus, information quality can indirectly, through perceived ease of use, explain 11.4% of the variation in user performance which is equal to (0.114/0.455=0.251) 25.1% of the total impact.

Discussion of Hypothesis H1 and its sub-hypotheses H1.a, H1.b, and H1.c

Testing hypothesis H1 and its sub-hypotheses concluded that information quality has positive impact on improving clinicians' performance at health centers. This enforces the conception that an increase in the quality of information entered into e-health system and the quality of system output contribute in enhancing the overall productivity and job performance of the clinical staff. Results of data analysis also proved that this impact is mediated by both system ease of use and system usefulness perception. That is, the higher the quality of patient information in the system, the more system users perceive the benefits of the system and find it easy to use and learn and in turn the more intention they are likely to have for utilizing the system and digging deep to pick its jewelries. These results came in line with what previous studies concluded. All of Cohen et al. (2016), Ali & Younes (2013), Peikari et al. (2015), Safdari et al. (2014), Etezadi-Amoli & Farhoomand (1996), and Shah & Peikari (2016) concluded positive impact of information quality on user performance with Ali & Younes (2013) emphasized the mediation of both perceived ease of use and perceived usefulness.

5.5.2 Hypothesis H2 Investigation

H2: Information quality of the adopted e-health system has a direct significant impact on physician-patient relationship and indirect significant impact through perceived usefulness and perceived ease of use.

- **H2.a:** Information quality of the adopted e-health system has a direct significant impact on physician-patient relationship.
- **H2.b:** Information quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived usefulness.
- **H2.c:** Information quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived ease of use.

Figure (5.4) is used to illustrate the direct and indirect effects of information quality on physician-patient relationship, assuming mediations.

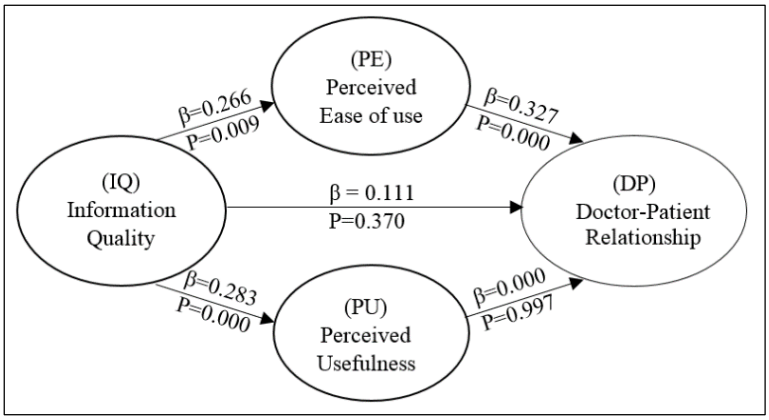


Figure (5.4): Part of study model zooming IQ→DP direct and indirect paths

Referencing Table (5.22), Total effect of IQ→DP path is (β =0.198, t=1.753, p=0.040) Referencing Table (5.21), Path coefficient of IQ→PE path equals (β=0.266, t=2.627, p=0.009), path coefficient of PE→DP path equals (β=0.327, t=4.274, p=0.000), path coefficient of IQ→PU path equals (β=0.283, t=3.701, p=0.000), and path coefficient of PU→DP path equals (β=0.000, t=0.004, p=0.997 *insignificant*).

Indirect effect of IQ→DP due to PE mediation is 0.266 x 0.327 = (β=0.087, t=2.284, p=0.026). Whereas, indirect effect of IQ→DP due to PU mediation is 0.286 x 0.000 = (β=0.000, t=?, p=? *insignificant*).

direct effect of Information Quality on Physician-Patient Relationship assuming mediation equals 0.198 – 0.087 = (β=0.111, t=0.897, p=0.370 *insignificant*) (t-test and p-value are from Table (5.21).

Validity of Hypothesis H2

From the aforementioned statistical calculations, it could not be concluded that Information Quality has any direct influence on Physician-Patient Relationship (β=0.111, p=0.370 *insignificant*) but still it has statistically significant positive indirect influence mediated by Perceived Ease of Use at significance level of α=0.05 (β=0.087, p=0.026). Consequently, information quality can explain 8.7% of the total variation in Physician-Patient Relationship through full mediation of Perceived Ease of Use.

Validity of Hypothesis H2.a

From the aforementioned statistical calculations, it could not be concluded that Information Quality has any direct influence on Physician-Patient Relationship at significance level of α=0.05 (β=0.111, p=0.370 *insignificant*).

Validity of Hypothesis H2.b

Likewise, the above statistical calculations could not conclude a statistically supporting evidence regarding any effect from Information Quality on Physician-Patient Relationship mediated by Perceived Usefulness at significance level of α=0.05, IQ→PU→DP path (β=0.000, t=?, p=? *insignificant*).

Validity of Hypothesis H2.c

The above statistical calculations, however, emphasized that Information Quality has statistically significant positive indirect impact on Physician-Patient Relationship fully mediated by Perceived Ease of Use at significance level of α=0.05 equals to (β=0.087, p=0.026). Thus, information quality indirectly, through perceived ease of use, explains 8.7% of the variation in Physician-Patient Relationship.

Discussion of Hypothesis H2 and its sub-hypotheses H2.a, H2.b, and H2.c

Hypothesis H2 and its sub hypotheses have investigated the impact of information quality on doctor-patient relationship. This investigation resulted in proving the existence of statistically significant indirect positive impact fully medicated by perceived ease of use. Direct impact and indirect impact through perceived usefulness were not compiled. This means that this study has no sufficient evidence to state that increasing quality of patient information in the system would directly simulate physicians to improve their relationship with their patients or to change the way they administer the encounters. Neither would perceiving the benefits of the system and being aware, as a physician, of system potential and benefits would help convincing physician to make use of the high quality information in hand to improve such a relationship. On the other hand, this study concluded that perceiving the ease of using and learning the new system has statistically significant positive effect on encouraging physician to improve their relationship with patients in light of the high quality patient information the system avails. It also means that information quality raises the perception affiliated with system ease of use which in turn pushes physicians to better their relationship and the way they interact with their patients. Upon the aforementioned, perceiving ease of use seems to be more important to system users than perceiving its benefits and that perceived ease of use works as driving force that guide physician towards better utilization of the system information to enhance their interaction and improve their relationship with their patients. Most of previous studies, the researcher stopped at, discussed system success impact, as a whole, on physician-patient relationship and did not investigate the effect of individual success components. Several previous studies agreed with current study conclusion, Makoul et al. (2001) and Etezadi-Amoli & Farhoomand (1996) stated that e-health system found to enhance several aspects of physician-patient communication, likewise, Morton & Wiedenbeck (2010) reported positive impact without attributing this result to specific system features. Sequist et al. (2007). on the other hand Patel et al. (2002) contradicted with current study results and reported negative impact of e-health implementation on physician-patient relationship and attributed this to visit interruption due to more screen gazing and losing eye contact with patients, visit is longer and more system driven, limitation on narrative documentation, and patients' worries about information

disclosure. Morton & Wiedenbeck (2010) reported no change in the relationship between the parties regarded to e-system adoption or system information quality.

5.5.3 Hypothesis H3 Investigation

H3: Information quality of the adopted e-health system has a direct significant impact on patient care and indirect significant impact through perceived usefulness and perceived ease of use.

- **H3.a:** Information quality of the adopted e-health system has a direct significant impact on patient care.
- **H3.b:** Information quality of the adopted e-health system has an indirect significant impact on patient care through perceived usefulness.
- **H3.c:** Information quality of the adopted e-health system has an indirect significant impact on patient care through perceived ease of use.

Figure (5.5) is used to illustrate the direct and indirect effects of information quality on patient care, assuming mediations.

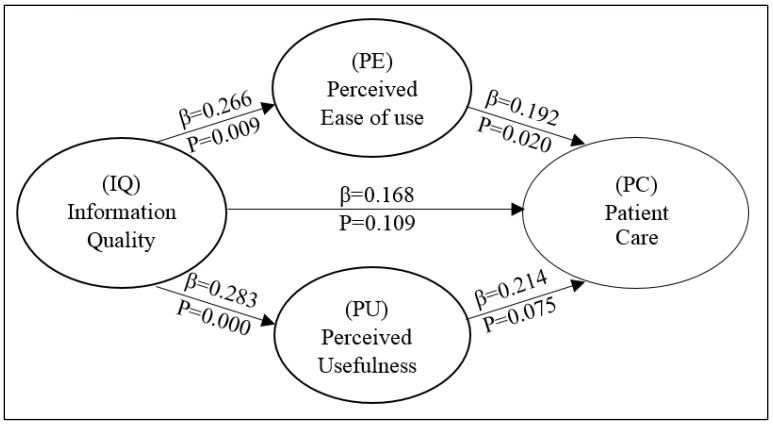


Figure (5.5): Part of study model zooming IQ→PC direct and indirect paths

Referencing Table (5.22), Total effect of IQ→PC path is (β=0.279, t=2.764, p=0.003) Referencing Table (5.21), Path coefficient of IQ→PE path is (β=0.266, t=2.627, p=0.009), path coefficient of PE→PC path is (β=0.192, t=2.336, p=0.020), path coefficient of IQ→PU path is (β=0.283, t=3.701, p=0.000), and path coefficient of PU→PC path is (β=0.214, t=0.1780, p=0.075).

Indirect effect of IQ→PC due to PE mediation is 0.266 x 0.192 = (β=0.051, t=1.821, p=0.083 *insignificant*), indirect effect of IQ→PC due to PU mediation is 0.283 x 0.214 = (β=0.061, t=1.654, p=0.123 *insignificant*).

Direct effect of Information Quality on Patient Care assuming mediation equals (β=0.168, t=1.601, p=0.109 *insignificant*), extracted from Table (5.21).

Validity of Hypothesis H3

From the aforementioned statistical calculations, there is no sufficiently significant evidence to conclude any indirect influence on Patient Care accountable to Information Quality as all mediating paths are insignificant. However, still there is a statistically significant positive direct effect at significance level of α=0.05 (β=0.279, t=2.764, p=0.003). Consequently, information quality can directly, with no medication, explain 27.9% of the total variation in Patient Care.

Validity of Hypothesis H3.a

From the aforementioned statistical calculations, it is concluded that Information Quality has statistically significant positive direct effect at significance level of α=0.05 (β=0.279, t=2.764, p=0.003) on Patient Care.

Validity of Hypothesis H3.b

Whereas, the above statistical calculations could not conclude a statistically supporting evidence regarding any effect from Information Quality on Patient Care mediated by Perceived Usefulness at significance level of α=0.05, indirect effect of IQ→PC due to PU mediation is 0.283 x 0.214 = (β=0.061, t=1.654, p=0.123 *insignificant*).

Validity of Hypothesis H3.c

Similarly, the above statistical calculations could not conclude a statistically supporting evidence regarding any effect from Information Quality on Patient Care mediated by Perceived Ease of Use at significance level of α=0.05, indirect effect of

IQ→PC due to PE mediation is 0.266 x 0.192 = (β=0.051, t=1.821, p=0.083 *insignificant*).

Discussion of Hypothesis H3 and its Sub-hypotheses H3.a, H3.b, and H3.c

Hypothesis H3 and its sub hypotheses have addressed the impact of information quality on patient care and concluded that information quality has statistically significant direct positive effect on patient care but could not compile any mediation effect caused by either perceived usefulness or perceived ease of use. Based on this conclusion, improvement in patient care is much connected to improving quality of information inserted into or produce by the system. This emphasizes the great importance of information quality in professionally treating patients and setting proper and effective treatment plans. Nevertheless, study analysis could not statistically support the conception that recognizing the easiness of using and learning the implemented e-health system and its contribution to easier patient consultation or even perceiving how useful and beneficial the system is in smoothing health center operations would facilitate the influence of information quality on improving the overall patient care. The study could not stand on a robust evidence to prove such mediation effect. This result agreed with the results of previous study of Peikari et al. (2015) which concluded positive direct impact of information quality on patient care. Most of other previous studies, stopped at by the researcher, discussed impact of system implementation success, as a whole, on patient care and did not investigate the effect of individual success components. Sequist et al. (2007) and Marshall & Chin (1998) reported positive impact of e-health system implementation on patient care and attributed that to the good features provided by the system to improve patient care such as the clinical reminder systems. Likourezos et al. (2004), on the other hand, reported limited impact. Bloom & Huntington (2010) study did not conclude any significant effect whereas Margalit et al. (2006) concluded negative impact and attributed this to the frequent disconnection with patients during the visit due to screen gazing and much keyboarding.

5.5.4 Hypothesis H4 Investigation

H4: System quality of the adopted e-health system has a direct significant impact on clinicians' performance and indirect significant impact through perceived usefulness and perceived ease of use.

H4.a: System quality of the adopted e-health system has a direct significant impact on clinicians' performance.

H4.b: System quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived usefulness.

H4.c: System quality of the adopted e-health system has an indirect significant impact on clinicians' performance through perceived ease of use.

Figure (5.6) is used to illustrate the direct and indirect effects of system quality on clinicians' performance, assuming mediations.

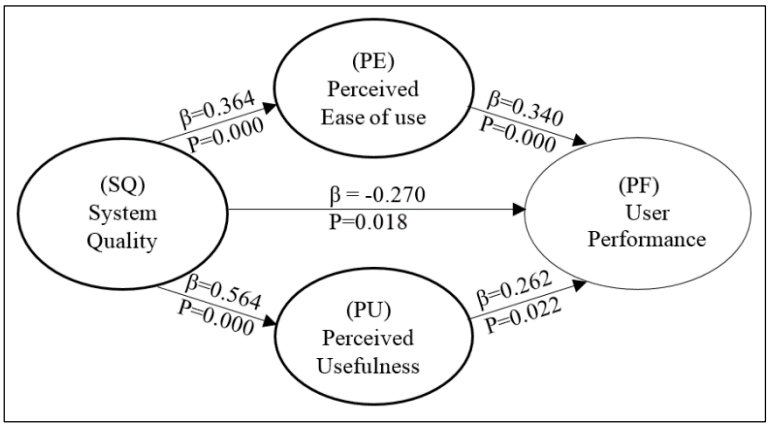


Figure (5.6): Part of study model zooming SQ→PF direct and indirect paths

Referencing Table (5.22), Total effect of SQ→PC path is (β= 0.034, t=0.342, p=0.366 *insignificant*)

Referencing Table (5.21), Path coefficient of SQ→PE path is (β=0.364, t=3.843, p=0.000), path coefficient of PE→PF path is (β =0.430, t=5.258, p=0.000), Path coefficient of SQ→PU path is (β =0.564, t=8.264, p=0.000), and Path coefficient of PU→PF path is (β =0.262, t= 2.006, p=0.022).

Indirect effect of SQ→PF due to PE mediation is 0.364 x 0.430 = (β=0.157, t=3.140, p=0.002), indirect effect of SQ→PF due to PU mediation is 0.564 x 0.262 = (β=0.148, t=2.055, p=0.040). Total indirect effect of SQ→PF due to the combined PE and PU

mediation is 0.157 + 0.148 = (β=0.305, t=3.845, p=0.000). Direct effect assuming mediation is 0.034 – 0.305 = (β= -0.270, t=2.364, p=0.018), t-test and p-value are from Table (5.21).

Validity of Hypothesis H4

From the aforementioned statistical calculations, there is sufficiently significant evidence to conclude positive indirect influence on User Performance accountable to System Quality mediated by both Perceived Usefulness and Perceived Ease of Use. At the same time, statistical calculations demonstrate statistically significant negative direct effect from System Quality on User Performance almost equal in magnitude to the indirect mediation effect. These two similar but opposite effects cancel each other ending with very small statistically insignificant total effect by System Quality on User Performance. Total effect=0.148+0.157-0.270= (β=0.034, p=0.366 *insignificant*).

Consequently, improvement in clinicians' performance due to the quality of the newly adopted e-health system could not be statistically concluded.

Validity of Hypothesis H4.a

The above statistical calculations shows a statistically supporting evidence regarding negative direct effect from System Quality on User Performance at significance level of α=0.05 (β= -0.270, t=2.364, p=0.018).

Validity of Hypothesis H4.b

The above statistical calculations advises a statistically supporting evidence regarding positive effect from System Quality on Clinicians' Performance mediated by Perceived Usefulness at significance level of α=0.05, indirect effect of SQ→PF due to PU mediation is 0.564 x 0.262 = (β=0.148, t=2.055, p=0.040)

Validity of Hypothesis H4.c

Similarly, The above statistical calculations concluded a statistically supporting evidence regarding positive effect from System Quality on Clinicians' Performance

mediated by Perceived Ease of Use at significance level of α=0.05, indirect effect of SQ→PF due to PE mediation is 0.364 x 0.430 = (β=0.157, t=3.140, p=0.002)

Discussion of Hypothesis H4 and its Sub-hypotheses H4.a, H4.b, and H4.c

Inspection of hypothesis H4 and its sub-hypotheses resulted in limited insignificant positive total impact of system quality on improving clinicians' performance at health centers. This total insignificant effect resulted from two contradictory forces, one of which is the negative direct significant impact of system quality on clinicians' performance and the other one is the positive significant impact of system quality on clinicians' performance stimulated by both perceived usefulness and perceived ease of use. Clinicians' awareness that the implemented system is ease to use, easy to learn and would help easing accomplishment of their assigned tasks with their consciousness of the capabilities of the system and the benefits they can gain from system features utilization worked as a positive force enhances the influence of system quality to improve clinicians' productivity and overall outcome. On the other hand, however, the actual system quality problems confronting system users such as frequent dis-connectivity, system slowness, system reliability issues and errors inserting data or generating outputs (as concluded from the evaluation of clinical staff responses to survey questions – see Table (5.8) reversely affected user performance in such a way that almost cancelled the effect mediated by perceived usefulness and perceived ease of use. This conclusion harmonized with Cohen et al. (2016) study which concluded negative effect on medical staff performance and productivity due to issues in response time, reliability, and form input space of the studied system and partially harmonized with Ali & Younes (2013) study in part of the mediated effect of both perceived usefulness and perceived ease of use. Other previous studies Ali & Younes (2013), Safdari et al. (2014) and Shah & Peikari (2016) contradicted with current study result and compiled that system quality had significant positive direct impact on user performance. This could be attributed to the nature and quality of the system they studied and that the addressed issues caused the negative impact did not show up in their studies.

This study concluded that system quality still has some issues that need intervention. This is attributable to the fact that the system is still immature and is

continuously posed to alteration, amendment, fixing and improvement. The old classic version of HIS is now much more stable compared to the new Family Health Team supporting version. The former version is in operation for more than 4 years and most of its problems and shortfalls have already been addressed, while the latter version, currently operational in most UNRWA-Gaza health centers, is still in its childhood and needs much of care and efforts to mature.

5.5.5 Hypothesis H5 Investigation

H5: System quality of the adopted e-health system has a direct significant impact on physician-patient relationship and indirect significant impact through perceived usefulness and perceived ease of use.

- **H5.a:** System quality of the adopted e-health system has a direct significant impact on physician-patient relationship.
- **H5.b:** System quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived usefulness.
- **H5.c:** System quality of the adopted e-health system has an indirect significant impact on physician-patient relationship through perceived ease of use.

Figure (5.7) is used to illustrate the direct and indirect effects of system quality on clinicians' performance, assuming mediations.

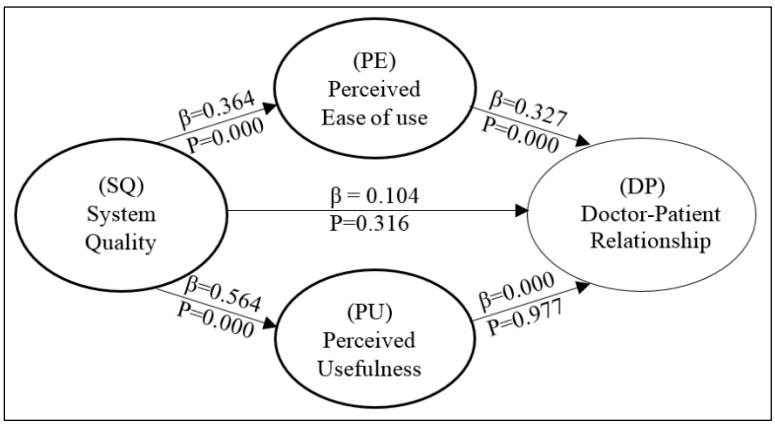


Figure (5.7): Part of study model zooming SQ→DP direct and indirect paths

Referencing Table (5.22), Total effect of SQ→DP path is (β=0.223, t=2.327, p=0.010) Referencing Table (5.21), Path coefficient of SQ→PE path is (β=0.364, t=3.843, p=0.000), path coefficient of PE→DP path is (β =0.327, t=4.274, p=0.000), Path

coefficient of SQ→PU path is (β =0.564, t=8.264, p=0.000), and Path coefficient of PU→DP path is (β =0.000, t= 0.004, p=0.997).

Indirect effect of SQ→DP due to PE mediation is 0.364 x 0.327 = (β=0.119, t=2.902, p=0.004), indirect effect of SQ→DP due to PU mediation is 0.564 x 0.000 = (β=0.000, t=?, p=? *insignificant*). Direct effect assuming mediation equals 0.223 – 0.119 = (β= 0.104, t=1.003, p=0.316 *insignificant*), t-test and p-value are from Table (5.21).

Validity of Hypothesis H5

Based on the above statistical calculations, it could not be concluded that System Quality has any direct influence on Physician-Patient Relationship (β= 0.104, t=1.003, p=0.316 *insignificant*) but still it has statistically significant positive indirect influence mediated by Perceived Ease of Use at significance level of α=0.05 (β=0.119, t=2.902, p=0.004). Consequently, System Quality can explain 11.9% of the total variation in Physician-Patient Relationship through full mediation of Perceived Ease of Use.

Validity of Hypothesis H5.a

From the aforementioned statistical calculations, it could not be concluded that System Quality has any direct influence on Physician-Patient Relationship at significance level of α=0.05 (β= 0.104, t=1.003, p=0.316 *insignificant*).

Validity of Hypothesis H5.b

Likewise, the above statistical calculations could not conclude a statistically supporting evidence regarding any effect from System Quality on Physician-Patient Relationship mediated by Perceived Usefulness at significance level of α=0.05, SQ→PU→DP path (β=0.000, t=?, p=? *insignificant*).

Validity of Hypothesis H5.c

The above statistical calculations, however, emphasized that System Quality has statistically significant positive indirect impact on Physician-Patient Relationship fully

mediated by Perceived Ease of Use at significance level of α=0.05 equals to (β=0.119, t=2.902, p=0.004). Thus, system quality indirectly, through perceived ease of use, explains 11.9% of the variation in Physician-Patient Relationship.

Discussion of Hypothesis H5 and its Sub-hypotheses H5.a, H5.b, and H5.c

Hypothesis H5 and its sub hypotheses have investigated the impact of system quality on doctor-patient relationship. Similar to hypothesis H2, This investigation resulted in proving the existence of statistically significant positive indirect impact fully mediated by perceived ease of use. Direct impact and impact through perceived usefulness were not concluded. This means that evidence is statistically insufficient to state that increasing quality of e-health system would convince physicians to enhance their relationship with their patients or to change the way they administer the visits. Neither would perceiving the benefits of the system and being aware, as a physician, of system potentials would help convincing physician to make use of the high quality system features to improve such a relationship. On the other hand, this study concluded that perceiving the ease of using and learning the new system and cognizing system capabilities to ease task accomplishment and patient consultation has statistically significant positive effect on encouraging physician to improve their relationship with patients in light of the high quality features of the system. Most of previous studies, the researcher stopped at, discussed system success impact as a whole on physician patient relationship and did not investigate the effect of individual success components. several previous studies agreed with current study conclusion, Makoul et al. (2001) and Etezadi-Amoli & Farhoomand (1996) stated that e-health system found to enhance several aspects of physician-patient communication, likewise, Morton & Wiedenbeck (2010) reported positive impact without attributing this result to specific system features. Sequist et al. (2007) whereas Patel et al. (2002) study contradicted with current study results and reported negative impact of e-health implementation on physician-patient relationship and attributed this negation to many reason encompassing: diagnosis is system driven, EMR introduced crucial and complex changes to the way physicians interact with patients and on the data recorded and incomplete and inconsistent patient records. Morton & Wiedenbeck (2010) reported no impact.

5.5.6 Hypothesis H6 Investigation

H6: System quality of the adopted e-health system has a direct significant impact on patient care and indirect significant impact through perceived usefulness and perceived ease of use.

H6.a: System quality of the adopted e-health system has a direct significant impact on patient care.

H6.b: System quality of the adopted e-health system has an indirect significant impact on patient care through perceived usefulness.

H6.c: System quality of the adopted e-health system has an indirect significant impact on patient care through perceived ease of use.

Figure (5.8) is used to illustrate the direct and indirect effects of system quality on clinicians' performance, assuming mediations.

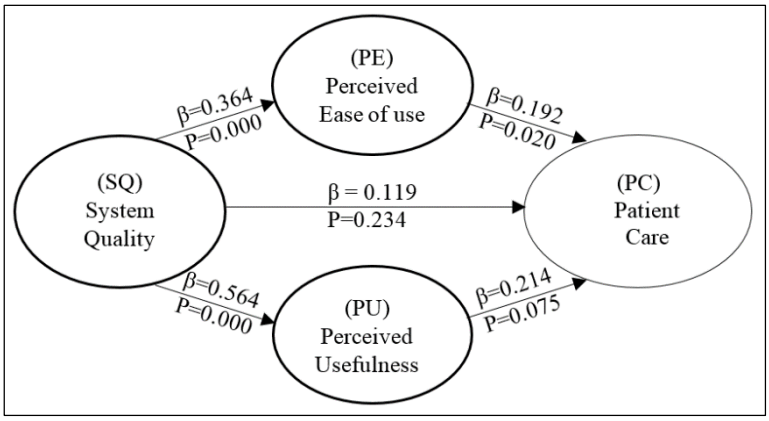


Figure (5.8): Part of study model zooming SQ→PC direct and indirect paths

Referencing Table (5.22), Total effect of SQ→PC is (β=0.310, t=3.749, p=0.000)

Referencing Table (5.21), Path coefficient of SQ→PE path is (β=0.364, t=3.843, p=0.000), path coefficient of PE→PC path is (β =0.192, t=2.336, p=0.020), Path coefficient of SQ→PU path is (β =0.564, t=8.264, p=0.000), and Path coefficient of PU→PC path is (β =0.214, t= 1.780, p=0.075).

Indirect effect of SQ→PC due to PE mediation is 0.364 x 0.192 = (β=0.070, t=2.047, p=0.041), indirect effect of SQ→PC due to PU mediation is 0.564 x 0.214 = (β=0.121, t=1.752, p=0.080 *insignificant*). Direct effect assuming mediation SQ→PC equals (β=0.119, t=1.189, p=0.234 *insignificant*), t-test and p-value are from Table (5.21).

Validity of Hypothesis H6

Based on the above statistical calculations, it could not be concluded that System Quality has any direct influence on Patient Care (β=0.119, t=1.189, p=0.234 *insignificant*) but still it has statistically significant positive indirect influence mediated by Perceived Ease of Use at significance level of α=0.05 (β=0.070, t=2.047, p=0.041). Consequently, System Quality can explain 7.0% of the total variation in Patient Care through full mediation of Perceived Ease of Use.

Validity of Hypothesis H6.a

From the aforesaid statistical calculations, there is no statistically sufficient evidence to concluded that System Quality has any direct influence on Patient Care at significance level of α=0.05 (β=0.119, t=1.189, p=0.234 *insignificant*).

Validity of Hypothesis H6.b

Likewise, the above statistical calculations could not conclude a statistically supporting evidence regarding any effect from System Quality on Patient Care mediated by Perceived Usefulness at significance level of α=0.05, SQ→PU→PC path (β=0.121, t=1.752, p=0.080 *insignificant*).

Validity of Hypothesis H6.c

The above statistical calculations, however, illustrates that System Quality has statistically significant positive indirect impact on Patient Care fully mediated by Perceived Ease of Use at significance level of α=0.05 equals to (β=0.070, t=2.047, p=0.041). Thus, system quality indirectly, through perceived ease of use, explains 7% of the variation in Patient Care.

Discussion of Hypothesis H6 and its Sub-hypotheses H6.a, H6.b, and H6.c

Hypothesis H6 and its sub hypotheses have explored how quality of the implemented e-health system influence patient care. This exploration concluded a statistically significant positive indirect effect fully medicated by perceived ease of use.

Direct effect and indirect influence attributable to perceived usefulness mediation were unprovable due to absence of statistically supporting evidence. Current study could not statistically prove that improving quality of e-health system would enhance the delivered patient care, neither proved that perceiving the benefits of the system and being aware, as a physician, of system potential and capabilities would help improving such service delivery. On the other hand, this study concluded a statistically valid evidence that perceiving the ease of using and learning the new system would positively influence patient care in light of the high quality features of the system. Most of previous studies, the researcher stopped at, discussed system success impact as a whole on physician patient relationship and did not investigate the effect of individual success components. Sequist et al. (2007) and Marshall & Chin (1998) harmonized with the results of current study and reported positive impact of e-health system implementation on patient care and attributed that to the good features provided by the system such as the clinical reminder instrument. Likourezos et al. (2004), on the other hand, reported limited impact. Bloom & Huntington (2010) study did not conclude any significant effect whereas Margalit et al. (2006) contradicted with this study results and concluded negative impact and attributed this to the frequent disconnection with patient during the visit due to screen gazing and much keyboarding.

Table (5.23) summarizes the conclusion of the direct and indirect hypothesized effects of independent variables on dependent variables.

Table (5.23): Summary of hypotheses testing

Hs	Path	Total Effect (H)		Direct Effect (H.a)		Effect Mediated by			
						PU (H.b)		PE (H.c)	
H1	IQ→PF	Valid	45.50%	Valid	26.60%	Valid	7.40%	Valid	11.40%
H2	IQ→DP	Valid	8.70%	Invalid	-	Invalid	-	Valid	8.70%
H3	IQ→PC	Valid	27.90%	Valid	27.90%	Invalid	-	Invalid	-
H4	SQ→PF	Invalid	-	Valid	(-27.00%)	Valid	14.80%	Valid	15.70%
H5	SQ→DP	Valid	11.90%	Invalid	-	Invalid	-	Valid	11.90%
H6	SQ→PC	Valid	7.00%	Invalid	-	Invalid	-	Valid	7.00%

5.6 Chapter Summary

This chapter addressed the data analysis process and concluded study results and compared results to previous studies conclusions to inspect the degree of matching among the study outcome and what other previous studies compiled. The chapter described the demographic characteristics of study sample and discussed their attitudes towards study variables to explore the degree of agreement with the conception of study variable and the extent to which they believe conception factors are true. Thereafter, proposed study model was tested for validity and reliability, both measurement and structural models were evaluated for consistency and indicator reliabilities, convergent and discriminant validities, collinearity, coefficient of determination and path coefficients. Hypotheses testing was then handled followed by discussion of concluded results and comparison with previous studies.

Chapter Six
Conclusion & Recommendations

Chapter Six: Conclusion & Recommendations

6.1 Introduction

This chapter initiates discussion of the results concluded in chapter-5 and summarizes the key findings and conclusion of this study. Additionally, it addresses recommendations and suggestions for future research.

6.2 Results' Discussion and Conclusion

6.2.1 Conclusion of Respondents Attitudes towards Study Variables

Referencing research questions and attitudes of respondents towards the different study variables, respondents highly agreed that HIS has high information quality and that system users have high perception towards system usefulness and system ease of use. On the other hand, respondent did not sufficiently vote for quality of the system being high. Response to (SQ4) "*HIS is always up and running*" for example reflected issues in system availability, likewise, response to (SQ5) "*HIS is fast and has timely response*" indicated that HIS is not fast enough. This could be attributed to the frequent internet connectivity failure due communication disturbance and link saturation. Additionally, response analysis showed moderate agreement to (SQ7) "*HIS makes it easier to correct your work errors*" and (SQ9) "*HIS is reliable and free from error*" which indicated that HIS does not have sufficient error correction or error avoidance capabilities. This can also be attributed to that fact that the system is still under development and not yet materialized as positive and consistent. Furthermore, Respondents showed moderate acceptance to (PF2) "*I can accomplish work assigned to me which usually exceeds my duties*" and this could be due to the high pressure on UNRWA health centers and the limitation in medical workforce that keep clinical staff continuously overloaded and accept no extra work. Similarly, attitudes towards patient care were all high except for (PC3) "*Patient waiting time is relatively short*", which sheds light on the high demand on UNRWA free-of-charge health care service and the limited number of health centers across Gaza strip. Physician-patient relationship also had some issues as (DP5) "*Patients increasingly participate in the development of their treatment plan*" was not highly accepted. HIS, currently, does not facilitate patient access to personal medical information which limits patient knowledge about their cases and in turn cannot effectively participate in putting treatment plans. Likewise,

(DP1) "*Patients have high confidence in physicians*" was not highly accepted either. Lack of confidence can be attributed to the dominant conceptions that current doctors were bad students who went to Russia for some years and returned with a false medical degree. This conception was supported by the large number of medical errors and medical injuries caused by wrong prescriptions and the disabilities and sometimes fatalities caused by failing simple surgeries.

6.2.2 Conclusion of Hypotheses Testing

Hypothesis testing proved that information quality positively impact clinicians' performance at health centers both directly and indirectly. This enforces the conception that an increase in the quality of information increases the overall productivity and job performance of the clinical staff. Data analysis also proved that higher information quality increases user perception towards system usefulness and system ease of use which in turn enforces staff productivity and performance. Similarly, it was proven that information quality has positive indirect impact on doctor-patient relationship fully mediated by perceived ease of use. No direct impact or indirect impact mediated by perceived usefulness were concluded. Likewise, information quality has direct positive effect on patient care but analysis could not compile any mediation effect caused by either perceived usefulness or perceived ease of use. On the other hand, inspecting system quality impact on user performance resulted in negative direct impact and at the same time positive indirect impact mediated by both perceived usefulness and perceived ease of use. system quality problems such as frequent dis-connectivity, system slowness, system reliability issues and errors inserting data or generating outputs reversely affected user performance in such a way that almost cancelled the effect mediated by perceived usefulness and perceived ease of use. It also was confirmed that system quality positively influenced both doctor-patient relationship and patient care through perceived ease of use. Direct effect or indirect effect mediated by perceived usefulness were not concluded either.

6.3 Recommendations

Following is a number of recommendations the researchers believes could enhance the impact of HIS on clinical performance and patient care and overcome the shortfalls identified in this study.

6.3.1 Practical Recommendations

This sections offers some practical recommendations that aim to improve system efficiency and effectiveness. These recommendations are grouped based on stakeholders who may benefit from system improvement and who are capable to applying such recommendations into two main groups, management and system developers.

Recommendations Related to Management

1) The study concluded shortfalls in HIS availability and response time due to connectivity issues. Management is advised to increase system availability and speed by securing wired connection between health centers and Gaza Field Office to overcome wireless frequent disturbance. It is also recommended that management should eliminate the effect of internet link being shared with other UNRWA services by installing dedicated direct internet lines at health centers.
2) Patient waiting time is another concern identified by study results, this should also be addressed by applying such procedures that would lessen the crowd at health centers and minimize patient waiting time. One example of such procedures can be installing electronic queuing system, another option is to activate on-phone appointment booking.
3) Confidence in physicians should also be seriously addressed. Perhaps, raise-awareness sessions that would introduce the capacities and knowledge of doctors and encourage clients to show more trust should be delivered to patients either by conducting session at health centers or by directing patient to streaming websites where such session are uploaded.
4) Data analysis also suggested that perceived usefulness and perceived ease of use have significant role in enhancing the effects of system quality and information quality on staff performance and that perceived ease of use is a key for increasing the influence of information quality and system quality on physician-patient

relationship and patient care as well. Consequently, it is crucial that such perception of both usefulness and ease of use get enhanced through more training sessions and workshops that would introduce the system and its features and capabilities to users and avail all necessary user-friendly materials to comprehend their awareness and stimulate their intention to use the system. Furthermore, it is vital to address system interface shortfalls and make it more user-friendly and easier to traverse and jump among its modules.

5) Alteration of e-health system to include the currently unsupported sections of health centers such as X-ray and physiotherapy is recommended.
6) It is highly recommended that UNRWA should unify e-health version at all health centers.
7) Regular monitoring and system evaluation has to be established to insure quality of data collected and information reported to decision makers.

Recommendations Related to System Developers

8) Error correction and error prevention are two other aspects that degrade system quality, it is recommended that system developers should address identified system errors and implement such procedures that would prevent predictable human mistakes and data entry errors.
9) To enhance participation of patients in the medical process, it is recommended that patient should have access to their personal medical record. Thus, initiation of a patient-portal website is highly recommended.
10) System Quality showed negative direct impact on staff performance and analysis suggested that this negative effect can be attributed to issues in the system like system availability, reliability, response speed, and system errors. These issue should be fairly addressed and enhanced to improved performance of health centers' human resources.
11) It is also recommended that e-health should be more integrated with other UNRWA systems such as RRIS, EMIS and REACH to overcome many work duplications especially for procurement and warehouse modules of REACH with health centers pharmacies (pharmacy module) which are consider as sub-warehouses.
12) Alteration of the system to automate the communication between the laboratory module and the chemical analyzers and other laboratory machinery to avoid typo.

13) Challenges faced by system users must be immediately communicated to concerned personnel and must be promptly handled.

6.3.2 Theoretical Recommendations

1) This study did not include service quality and network infrastructure, it is highly recommended that two factors be addressed in future studies.
2) It is also good to restudy the system a while ahead, after maturing and becoming fairly stable and error free to explore to what extent the system achieved its objective.
3) This study used a questionnaire based quantitative survey methodology, future studies may use different methodologies and compare outcome.
4) This study introduced a new model and ascertained its validity and reliability to explain variations in user performance, physician-patient relationship and patient care, thus is it recommended that researcher should use this model in future studies.
5) Using the proposed model to study other systems adopted by other health care providers in Gaza is recommended.
6) This study introduced the impact of information quality and system quality on patient care and physician-patient relationship, future studies may test the impact of other factors on them.

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Appendix-A: Questionnaire (English)

Health Center: _____

QUESTIONNAIRE

Impact of E-Health System Implementation at UNRWA-Gaza Health Centers on Medical Performance and Health Care

Dear Employee,

This study aims to contribute to the understanding of the effects of the adoption of information technology systems in health care centers in general. Additionally, it focuses on identifying potential improvements in the performance of workers in primary health care centers of UNRWA in Gaza, in particular attributable to the recent implementation of health information system. This scientific research is a mandatory prerequisite for the researcher to complete requirement of master degree in business administration.

Researcher thank you for your generous voluntary participation in this study by carefully reading the questions in the various paragraphs of this questionnaire and answer them accurately and objectively. Your post is necessary for the success of this study, which aims to highlight the role of health information systems in improving medical performance and health care, which in turn contribute to the improvement and development of the healthcare sector in general and health care services in UNRWA-Gaza in particular.

I would like to emphasize that all the answers you provide, which should not take more than 20 minutes, will be treated confidentially and will only be used for research purposes.

Thank you very much for your time and support.

Note: should you have the willing to get a copy of the results of this research, please write your name, e-mail,

Name: _____ Email: _____

Researcher: **Imad Ahmad Bader**
Mobile: 0599891702
Master of business administration
Faculty of Commerce
Islamic University of Gaza

Section one: Demographic Information

Please supply your input for the following demographic questions, cross next to the proper category.

Age:

Less than 30 ☐ 30-Less than 40 ☐ 40- Less than 50 ☐ 50 or more ☐

Gender: Male ☐ Female ☐

Years of experience: How long have you been working in health sector

Less than 5 ☐ 6- Less than 10 ☐ 10- Less than 15 ☐ 15- Less than 20 ☐

20 or more ☐

Specialization: Select the closest category to your specialization

General physician ☐ Specialist physician ☐ Others (_____) ☐

Medical support staff ☐ Admin staff ☐

Have IT background: How do you count yourself in terms of IT usage, before e-health was implemented?

Good IT user ☐ Fair IT user ☐ Poor IT User ☐

Section One: Information Quality

To what extent do you agree with the following paragraphs affiliated with the information Quality of the health information system?

#	1- Strongly Disagree ⟶ 7- Strongly Agree	1						7
1	HIS provides you with accurate information	1	2	3	4	5	6	7
2	Information contained in HIS is timely and regularly updated	1	2	3	4	5	6	7
3	HIS provides you with information that is clear and easy to understand	1	2	3	4	5	6	7
4	HIS provides you with information that is valid and reliable	1	2	3	4	5	6	7
5	HIS provides you with information that is complete and sufficiently detailed	1	2	3	4	5	6	7
6	HIS provides you with consistent information	1	2	3	4	5	6	7
7	HIS provides you with relevant information	1	2	3	4	5	6	7
8	HIS provides you with easily accessible and usable information	1	2	3	4	5	6	7
9	Data are inserted into HIS immediately	1	2	3	4	5	6	7
10	HIS stores patient data in a standard format	1	2	3	4	5	6	7

Section Two: System Quality

To what extent do you agree with the following paragraphs affiliated with the System Quality of the health information system?

#	1- Strongly Disagree ⟶ 7- Strongly Agree	1	⟶					7
1	HIS functions well according to its purpose.	1	2	3	4	5	6	7
2	HIS is adaptable to upcoming needs of users	1	2	3	4	5	6	7
3	HIS Meets information security and privacy requirement	1	2	3	4	5	6	7
4	HIS is always up and running	1	2	3	4	5	6	7
5	HIS is fast and has timely response	1	2	3	4	5	6	7
6	HIS can be integrated with other support system in the health center	1	2	3	4	5	6	7
7	HIS makes it easier to correct your work errors	1	2	3	4	5	6	7
8	HIS helps you to reduce errors in your work.	1	2	3	4	5	6	7
9	HIS is reliable and Free from error	1	2	3	4	5	6	7
10	HIS is flexible and customizable to meet health center style of work	1	2	3	4	5	6	7
11	HIS makes it easier to prepare the required reports	1	2	3	4	5	6	7

Section Three: Perceived Usefulness

To what extent do you agree with the following paragraphs affiliated with the Perceived Usefulness of the health information system?

#	1- Strongly Disagree ⟶ 7- Strongly Agree	1	⟶					7
1	HIS improves the quality of my work	1	2	3	4	5	6	7
2	HIS allows me to have quick access to patients data	1	2	3	4	5	6	7
3	HIS facilitates communication of information among various care providers	1	2	3	4	5	6	7
4	HIS assists in avoiding duplication of examinations	1	2	3	4	5	6	7
5	HIS reduces the risk of error in healthcare service	1	2	3	4	5	6	7
6	HIS gives me greater control over my work schedule	1	2	3	4	5	6	7
7	HIS enhances my overall effectiveness in my job	1	2	3	4	5	6	7
8	HIS makes it easier to do my job	1	2	3	4	5	6	7

Section Four: Perceived Use of Use

To what extent do you agree with the following paragraphs affiliated with the Perceived Use of Use of the health information system?

#	1- Strongly Disagree ⟶ 7- Strongly Agree	1	⟶					7
1	I think it is easy to learn to use HIS	1	2	3	4	5	6	7
2	I think HIS is easy to use	1	2	3	4	5	6	7
3	I think HIS makes my consultations with patients easier	1	2	3	4	5	6	7
4	I think I will become skilled using HIS	1	2	3	4	5	6	7
5	I think HIS will be easy for physicians to use	1	2	3	4	5	6	7
6	I think it is easy to get the system do what I want it to do	1	2	3	4	5	6	7
7	I think it is easy to interact with HIS (respond to pop up dialogs and system instructions, supply input needed to some processes execution or report generation)	1	2	3	4	5	6	7

Section Four: User Performance

To what extent do you agree with the following paragraphs affiliated with your Performance?								
#	**1- Strongly Disagree ⟶ 7- Strongly Agree**	1						7
1	I can do large amount of work	1	2	3	4	5	6	7
2	I can accomplish work assigned to me which usually exceeds my duties	1	2	3	4	5	6	7
3	I can solve my work problems easily	1	2	3	4	5	6	7
4	I hardly ever make mistakes in work	1	2	3	4	5	6	7
5	I follow proper procedures in solving problems at work environment	1	2	3	4	5	6	7
6	I accomplish assigned tasks effectively and efficiently	1	2	3	4	5	6	7
7	I accomplish assigned tasks quickly and accurately	1	2	3	4	5	6	7
8	I communicate gently with my colleagues and others	1	2	3	4	5	6	7
9	I do effectively coordinated work with my colleagues	1	2	3	4	5	6	7
10	I create new ideas that simplify performing my work	1	2	3	4	5	6	7
11	I work on achieving my employment goals and on developing my career path	1	2	3	4	5	6	7
12	I constantly work on improving the quality of my performance	1	2	3	4	5	6	7

Section Four: Physician-Patient Relationship

To what extent do you agree with the following paragraphs affiliated with Physician-Patient Relationship?								
#	**1- Strongly Disagree ⟶ 7- Strongly Agree**	1						7
1	Patients have high confidence in physicians	1	2	3	4	5	6	7
2	Doctors have high credibility with patients	1	2	3	4	5	6	7
3	Patients are more satisfied with the received medical service	1	2	3	4	5	6	7
4	Doctors have positive and effective interaction with patients	1	2	3	4	5	6	7
5	Patients increasingly participate in the development of their treatment plan	1	2	3	4	5	6	7
6	The language and terminology used by the doctor with his patient commensurate with the cognitive level of the patient	1	2	3	4	5	6	7
7	Patients have high confidence in physicians	1	2	3	4	5	6	7

Section Four: Patient Care

To what extent do you agree with the following paragraphs affiliated with Patient Care?								
#	**1- Strongly Disagree ⟶ 7- Strongly Agree**	1						7
1	Quality of medical care received by the patients is high	1	2	3	4	5	6	7
2	Cost of patient care is relatively low	1	2	3	4	5	6	7
3	Patient waiting time is relatively short	1	2	3	4	5	6	7
4	Errors in laboratory tests hardly ever happens	1	2	3	4	5	6	7
5	Patient information are treated securely	1	2	3	4	5	6	7

End of Questionnaire

Appendix-B: Questionnaire (Arabic)

اسم العيادة: _____

استبيان

أثر تطبيق نظام الصحة المحوسب في مراكز الصحة التابعة لوكالة الغوث (الأنروا) بغزة على الأداء الطبي والرعاية الصحية

عزيزي الموظف،
تهدف هذه الدراسة للمساهمة في فهم الآثار المترتبة على اعتماد نظم تكنولوجيا المعلومات في مراكز الرعاية الصحية بوجه عام كما وتركز على تحديد التحسينات الممكنة في أداء العاملين في مراكز الرعاية الصحية الأولية التابعة لوكالة الغوث (الأنروا) بغزة بشكل خاص والتي تعزى إلى تطبيق الأنروا لنظام المعلومات الصحي المحوسب. هذا، ويقوم الباحث بإجراء هذه الدراسة كمتطلب إلزامي لإكمال الأطروحة العلمية لنيل درجة الماجستير في إدارة الأعمال

يشكر الباحث منك مشاركتك الطوعية الكريمة في هذه الدراسة من خلال قراءة الأسئلة في الفقرات المختلفة لهذا الاستبيان بعناية والإجابة عليها بدقة وموضوعية. مشاركتك ضرورية لإنجاح هذه الدراسة التي تهدف إلى تسليط الضوء على الدور الذي تلعبه نظم المعلومات الصحية في تحسين أداء العاملين في مجال الصحة والذي بدوره يساهم في تحسين وتطوير قطاع الرعاية الصحية بشكل عام وخدمات الرعاية الصحية في الأونروا-غزة بشكل خاص.
أود التأكيد على أن جميع الأجوبة التي تقدمها- والتي لا ينبغي أن تستغرق أكثر من 20 دقيقة- ستعامل بسرية تامة وأنها لن تستخدم إلا لأغراض البحث العلمي فقط.

شكرًا جزيلًا لكم على وقتكم ودعمكم

ملاحظة: إذا كنت ترغب في الحصول على نسخة من نتائج هذا البحث، رجاءً سجل اسمك وبريدك الإلكتروني.

الاسم: _____ البريد الإلكتروني: _____

الباحث: **عماد أحمد بدر**
رقم الجوال: 0599891702
برنامج الماجستير في إدارة الأعمال
كلية التجارة
الجامعة الإسلامية بغزة

المحور الأول: المعلومات الديمغرافية

الرجاء الإجابة على الأسئلة التالية، ضع علامة x في المربع المجاور للفئة المناسبة

العُمر:

☐ أقل من 30 عام ☐ 30 إلى أقل من 40 عام ☐ 40 إلى أقل من عام 50 ☐ 50 عام أو أكثر

الجنس: ☐ أنثى ☐ ذكر

عدد سنوات الخبرة: كم عدد السنوات التي عملت بها في مجال الصحة

☐ أقل من 5 ☐ 5 – إلى أقل من 10 ☐ 10 - إلى أقل من 15 ☐ 16 - إلى أقل من 20

☐ أكثر من 20 سنة

التخصص: اختر من التخصصات التالية الأقرب إلى تخصصك

☐ طبيب متخصص ☐ طبيب عام ☐ فريق دعم طبي (ممرض...إلخ) ☐ موظف إداري

☐ أخرى (هو: _____)

الخلفية عن تكنولوجيا المعلومات: كيف تعد نفسك كمستخدم لتكنولوجيا المعلومات لا سيما قبل تطبيق نظام الصحة المحوسب؟

☐ خلفية ضعيفة ☐ خلفية متوسطة ☐ خلفية جيدة

المحور الثاني: جودة المعلومات في نظام الصحة المحوسب (Information Quality)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بجودة المعلومات في نظام الصحة المحوسب؟

#	1- غير موافق بشدة .....7- موافق بشدة	1						7
1	يوفر نظام الصحة المحوسب معلومات دقيقة عن المرضى	1	2	3	4	5	6	7
2	يتم تحديث معلومات المرضى في نظام الصحة المحوسب بشكل مستمر ومنتظم	1	2	3	4	5	6	7
3	يوفر نظام الصحة المحوسب معلومات واضحة وسهلة الفهم	1	2	3	4	5	6	7
4	يوفر نظام الصحة المحوسب معلومات صحيحة ويمكن الاعتماد عليها	1	2	3	4	5	6	7
5	يوفر نظام الصحة المحوسب معلومات كاملة عن المرضى ومفصلة بشكل كافي	1	2	3	4	5	6	7
6	يوفر نظام الصحة المحوسب معلومات متوافقة ومتناسقة في مختلف أجزاءه	1	2	3	4	5	6	7
7	يوفر نظام الصحة المحوسب المعلومات ذات الصلة والمناسبة لأداء عملي	1	2	3	4	5	6	7
8	يوفر نظام الصحة المحوسب معلومات يسهل الوصول اليها وقابلة للاستخدام عند الحاجة	1	2	3	4	5	6	7
9	يتم إدخال البيانات في نظام الصحة المحوسب عند الحصول عليها مباشرًة	1	2	3	4	5	6	7
10	يتم تخزين البيانات وفق اصطلاحات وتعريفات موحدة (معيارية)	1	2	3	4	5	6	7

المحور الثالث: جودة النظام في نظام الصحة المحوسب (System Quality)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بجودة نظام الصحة المحوسب؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	يستطيع نظام الصحة المحوسب تلبية وتأدية المهام التي أنشئ من أجلها	1	2	3	4	5	6	7
2	يلبي نظام الصحة المحوسب الاحتياجات المستقبلية للمستخدمين	1	2	3	4	5	6	7
3	يوفر نظام الصحة المحوسب آليات للمحافظة على الخصوصية وعلى أمن المعلومات	1	2	3	4	5	6	7
4	يعمل نظام الصحة المحوسب بشكل مستمر فهو دائما متاح ويمكن استخدامه	1	2	3	4	5	6	7
5	يوفر نظام الصحة المحوسب المعلومات المطلوبة في الوقت المناسب فهو سريع الاستجابة	1	2	3	4	5	6	7
6	يتكامل نظام الصحة المحوسب مع الأنظمة الأخرى داخل المؤسسة الطبية	1	2	3	4	5	6	7
7	يسهل نظام الصحة المحوسب عملية تصحيح الأخطاء بشكل كبير	1	2	3	4	5	6	7
8	يساعد نظام الصحة المحوسب على تقليل نسبة الأخطاء في العمل	1	2	3	4	5	6	7
9	يعمل نظام الصحة المحوسب بستقرار ويمكن الاعتماد عليه	1	2	3	4	5	6	7
10	يمكن تخصيص نظام الصحة المحوسب بحيث يتوافق مع أسلوب العمل داخل العيادة	1	2	3	4	5	6	7
11	يساعد نظام الصحة المحوسب في إعداد التقارير اللازمة بشكل سهل	1	2	3	4	5	6	7

المحور الرابع: الفوائد المدركة لنظام الصحة المحوسب (Perceived Usefulness)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بالفوائد المدركة لنظام الصحة المحوسب؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	يحسن نظام الصحة المحوسب من جودة العمل الذي أقوم به	1	2	3	4	5	6	7
2	يمكنني نظام الصحة المحوسب من الوصول إلى بيانات المرضى بشكل سريع	1	2	3	4	5	6	7
3	يساعد نظام الصحة المحوسب على تبادل المعلومات بين مؤسسات الرعاية الطبية المختلفة	1	2	3	4	5	6	7
4	يساعد نظام الصحة المحوسب على تجنب ازدواجية/تكرار الفحوص الطبية	1	2	3	4	5	6	7
5	يقلل نظام الصحة المحوسب نسبة خطرالوقوع في الأخطاء أثناء تقديم خدمة الرعاية الطبية	1	2	3	4	5	6	7
6	يعطيني نظام الصحة المحوسب قدرة أكبر على التحكم بجدول أعمالي	1	2	3	4	5	6	7
7	يزيد نظام الصحة المحوسب من فاعليتي في أداء عملي	1	2	3	4	5	6	7
8	يمكنني نظام الصحة المحوسب من إنجاز عملي بشكل أسهل	1	2	3	4	5	6	7

المحور الخامس: سهولة الاستخدام المدركة لنظام الصحة المحوسب (Perceived Ease of Use)

إلى أي مدى تتفق مع الفقرات التالية الخاصة سهولة الاستخدام المدركة في استخدام نظام الصحة المحوسب؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	أعتقد أنه من السهل تعلم كيفية استخدام نظام الصحة المحوسب	1	2	3	4	5	6	7
2	أعتقد أن نظام الصحة المحوسب سهل الاستخدام	1	2	3	4	5	6	7
3	أعتقد أن نظام الصحة المحوسب يسهل عملية اتخاذ القرار ووضع خطط علاجية صحيحة	1	2	3	4	5	6	7
4	أعتقد أنني سأصبح ماهرا في استخدام نظام الصحة المحوسب	1	2	3	4	5	6	7
5	أعتقد أن أي طبيب يمكنه استخدام نظام الصحة المحوسب بسهولة	1	2	3	4	5	6	7
6	أعتقد أنه من السهل أن أجعل نظام الصحة المحوسب يقوم بفعل ما أريده أن يفعل	1	2	3	4	5	6	7
7	أعتقد أنه من السهل علي أن أتفاعل مع نظام الصحة المحوسب (الاستجابة للرسائل المنبثقة عن النظام ومَدَّهُ بالمدخلات التي يطلبها من أجل تنفيذ عمليات معينة أو إخراج تقارير محددة)	1	2	3	4	5	6	7

المحور السادس: الأداء الطبي (Performance)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بالأداء الطبي؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	أستطيع إنجاز كمية كبيرة من الأعمال	1	2	3	4	5	6	7
2	أستطيع إنجاز الأعمال التي أكلف بها والتي تتعدى مسؤولياتي	1	2	3	4	5	6	7
3	أستطيع حل مشاكلي الوظيفية بسهولة	1	2	3	4	5	6	7
4	أنا حذر وقلَّما أرتكب الأخطاء	1	2	3	4	5	6	7
5	أتخذ الإجراءات المناسبة لحل المشاكل في بيئة العمل	1	2	3	4	5	6	7
6	أُأدي الأعمال التي أكلف بها بكفاءة وفاعلية	1	2	3	4	5	6	7
7	أُأدي الأعمال التي أكلف بها بسرعة ودقة	1	2	3	4	5	6	7
8	أتعامل بلطف مع الآخرين أثناء تأديتي للعمل	1	2	3	4	5	6	7
9	أقوم بالتنسيق مع زملائي في العمل بشكل فعال	1	2	3	4	5	6	7
10	ابتكر أفكار جديدة تسهل أدائي للأعمال التي أقوم بها	1	2	3	4	5	6	7
11	أعمل على تحقيق أهدافي الوظيفية وتطوير مساري الوظيفي	1	2	3	4	5	6	7
12	أعمل بستمرار على تحسين جودة أدائي	1	2	3	4	5	6	7

المحور السابع: رعاية المرضى (Patient Care)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بجودة رعاية المرضى؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	جودة الرعاية الطبية التي يتلقاها المرضى عالية	1	2	3	4	5	6	7
2	تكلفة الرعاية الطبية للمرضى منخفضة نسبيًا	1	2	3	4	5	6	7
3	فترة انتظار المرضى لتلقي العلاج قصيرة نسبيًا	1	2	3	4	5	6	7
4	الأخطاء في الفحوصات المخبرية قلما تحدث	1	2	3	4	5	6	7
5	معلومات المرضى تعامل بخصوصية وسرية تامة	1	2	3	4	5	6	7

المحور الثامن: علاقة الطبيب بالمريض (Doctor-Patient Relationship)

إلى أي مدى تتفق مع الفقرات التالية الخاصة بعلاقة الطبيب بالمريض؟								
#	1- غير موافق بشدة .....7- موافق بشدة	1	←					7
1	ثقة المرضى في الأطباء عالية	1	2	3	4	5	6	7
2	هناك مصداقية عالية للأطباء مع المرضى	1	2	3	4	5	6	7
3	هناك تحسن في مستوى رضا المرضى عن الخدمة الطبية المقدمة لهم	1	2	3	4	5	6	7
4	تفاعل الأطباء مع المرضى إيجابي وفعال	1	2	3	4	5	6	7
5	هناك ازدياد في مستوي مشاركة المريض في وضع الخطة العلاجية	1	2	3	4	5	6	7
6	اللغة والمصطلحات التي يستخدمها الطبيب مع المريض تتناسب مع المستوى الإدراكي للمريض	1	2	3	4	5	6	7

End of Questionnaire انتهى الاستبيان

Appendix-C: Questionnaire Evaluation (List of Referees)

Academic and Professional Referees' Names and Titles

	Name	Title
1.	Dr. Wasim I. Habil	Associate Professor, Faculty of Commerce, Islamic University of Gaza.
2	Dr. Hatem A. Elaydi	Associate Professor, Faculty of Engineering, Islamic University of Gaza.
3	Dr. Mansour M. Alayoubi	Assistant Professor, Business Administration, Palestine Technical College - Deir balah -Gaza.
4	Dr. Nabeel A. Allouh	Human Development Consultant, General Personnel Council - Gaza
5	Wael Thabet	Assistant Professor, Faculty of Economics and Administrative Sciences, Al-Azhar University
6	Ramez Bdair	Assistant Professor, Faculty of Economics and Administrative Sciences, Al-Azhar University
7	Hisham Madi	Assistant Professor, Faculty of Engineering, Islamic University of Gaza.
8	Khalil Madi	Faculty of Economics and Administrative Sciences, Al-Azhar University
9	Akram Sammour	Assistant Professor, Faculty of Engineering, Islamic University of Gaza.
10	Mohammad Ghazal	Head of Scientific Research, University College of Science and Technology