Faculty of Graduate Studies

Master of Health Informatics

The extent to which physicians and patients accept receiving medical laboratory test results from Medicare medical laboratories via the web and mobile applications in Hebron governorate as an example of developing health services through the use of technological applications

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This thesis was submitted in partial fulfillment of the requirement for the master degree in health informatics program

Approval form

“The extent to which physicians and patients accept receiving medical laboratory test results from Medicare medical laboratories via the web and mobile applications in Hebron governorate as an example of developing health services through the use of technological applications**”**

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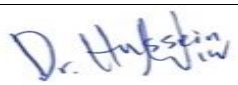
1. Supervisor: Dr. Hussein Jabareen	
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Dedication

My humble efforts I dedicate to

My Family

For their patience and understanding

My Sweet Mother

A strong and gentle soul who taught me to trust Allah, believe in hard work and that so much could be done with little

My Loving Father

For earning an honest living for us and supporting and encouraging me to believe in myself

My Lovely brothers and sister

For making me able to get such success and honor

To my friend for her love

To martyrs and detainees

To my people

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Declaration

الإقرار

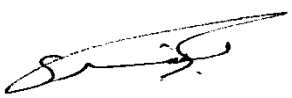
أنا الموقع اسمي أدناه مقدم الرسالة التي تحمل العنوان:

“The extent to which physicians and patients accept receiving medical laboratory test results from Medicare medical laboratories via the web and mobile applications in Hebron governorate as an example of developing health services through the use of technological applications”

"مدى تقبل الأطباء والمرضى لتلقي نتائج الفحوصات المخبرية الطبية من مختبرات ميديكير الطبية عبر تطبيق الويب والهاتف المحمول في محافظة الخليل كمثال على تطوير الخدمات الصحية من خلال استخدام التطبيقات التكنولوجية"

أقر بأن ما اشتملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة عليه حيثما ورد، وأن هذه الرسالة ككل أو أي جزء منها لم يقدم من قبل لنيل أي درجة علمية أو بحث علمي لدى أية مؤسسة تعليمية أو بحثية أخرى.

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

Student Name:	**Bushra Ibraheem Shalaldeh**	**اسم الطالب:**
Signature:		**التوقيع:**
Date:		**التاريخ:**

Abstract

HIT applications increasingly become available and have started recently to be used in the Palestinian environment. Medicare is a Palestinian medical laboratories company that has started using mobile and web applications to send lab test results to physicians and patients electronically and there are no previous studies conducted to evaluate them and measure the extent of their acceptance among users as an example of Palestinian health services development.

The purpose of the current study is to utilize (TAM) to describe the extent of acceptance of patients and physicians who use Medicare's smartphone and web applications in Hebron governorate and the factors that affect their acceptance. Also, to measure the impact of using Medicare's applications as an example on the quality of provided healthcare services.

A descriptive cross-sectional study was conducted on patients and physicians who are using Medicare's mobile and web applications in Hebron governorate as a result of the availability of 4 branches of Medicare medical laboratories in Hebron governorate including Hebron, ad-Dhahiriya, Yatta, and Dora. Also, the number of citizens of Hebron governorate is large compared to other Palestinian governorates, and as a result of the availability of Medicare branches in the city and the towns in Hebron governorate, this allows to compare between the level of acceptance to use Medicare's applications between users from city and town. Data collection was conducted between 9th of September to 20th of October, 2020 using paper-based questionnaire. The questionnaire contained a set of relevant questions and measuring items based on (TAM) main constructs.120 questionnaires were sent to patients and physicians, 113 were returned back with a response rate of (94.2%). There were (54%) males and (46%) females participants with an average age of 31.2 years old. Patients represented (73.5%) and physicians represented (26.5%). 42 participants were from Hebron city and the rest (71) were from different towns of Hebron governorate.

The level of all (TAM) core constructs (perceived ease of use PEOU, perceived usefulness PU, attitude toward using ATU, and behavioral intent to use BIU) were high which mean that Medicare's mobile and web applications were easy to use, useful, and the users had high attitude and intent to use them which indicated that the level of patients' and physicians' acceptance to use Medicare's applications was high. The results confirmed original (TAM) findings as there

were positive and significant correlations between 1) (PEOU) of Medicare's applications and patients' and physicians' perceived usefulness and their attitude toward using them, 2) (PU) by patients and physicians and their attitude and intent to use Medicare's applications, 3) and patients' and physicians' (ATU) and their intent to use Medicare' applications
Also, this study identified external factors that affected significantly and positively (TAM) main constructs and then the overall acceptance to use Medicare's electronic applications and other (E-Health) applications and these factors include: the availability of internet at home and workplace, user's self-efficacy in using mobile and web applications, training patients and physicians by Medicare staff on using Medicare's applications, the interior design of Medicare's applications, and patients' and physicians' trust that Medicare's mobile and web applications maintain the privacy of health information.

Besides, the current study showed some differences between participants' acceptance according to some demographic and personal characteristics include place of residence, patients or physicians, educational level, computer or laptop ownership, 3G usage, having general knowledge of using mobile and web applications, usage of (E-Health) apps, time period of using Medicare's app, the extent of using Medicare's app, and the user's favorite way to receive lab test results (Medicare's app, email, fax, and paper).

Then, using a set of items to explore the impact of using Medicare's mobile and web application on the quality of service provided by Medicare medical laboratories from several domains (availability of information, communication, timeliness), the level of quality assessment was high and then the results showed that using Medicare's mobile and web applications affected positively and significantly the quality of services provided by Medicare's medical laboratories company.
As all relationships in this study are significant, the results confirmed the applicability of adopting other smart (HIT) applications in Palestine.

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List of abbreviations

AI	Artificial Intelligence
ATU	Attitude Toward Using
BIU	Behavioral Intention to Use
CDSS	Clinical Decision Support System
CPOE	Computerized Provider Order Entry
E-Health	Electronic Health
HER	Electronic Health Record
EMR	Electronic Medical Record
E-Prescription	Electronic Prescription
HI	Health Information
HIS	Hospital Information System
HISs	Health Information Systems
ICT	Information and Communication Technology
IOM	Institute Of Medicine
IoT	Internet of Things
IT	Information Technology
mHealth	Mobile Health
PEOU	Perceived Ease of Use
PHR	Patient Health Record
PU	Perceived Usefulness
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasonable Action
WHO	World Health Organization

Chapter one: Introduction

1.1. Introduction

Tremendous progress has occurred to healthcare provision which has changed the policies of healthcare worldwide. The World Health Organization (WHO) has recommended healthcare institutions to encourage the participation of patients in their healthcare and treatment programs (Liu, Tsai, & Jang, 2013). To improve working routines, there was a need to adopt a link between telecommunication services and technologies of computing in the term of Information and Communication Technology **(**ICT**).** ICT is influenced by different factors related to organization, technology, economy, and individuals (Almeida, Farias, & Carvalho, 2017).

Healthcare as an industry is fulfilling with information that is needed to implement multiple activities including clinical treatment, healthcare management, and healthcare statistics to utilize in different researches and experiments. This information needs to be accurate, accessible, and real-time high quality due to the sensitivity of health information and its impact on patients' health (Hsiao, Chang, & Chen, 2011). Thus, there is a need to employ **(**ICT**)** tools and services to keep health data and information good to use (Hsiao et al., 2011). However, the application of (ICT) needs complicated technologies in addition to high costs and particular behaviors from stakeholders (Davis, Bagozzi, & Warshaw, 1989). To enhance efficiency and effectiveness of healthcare activities management, improve outcomes, decrease costs, and face the challenges of changing healthcare policies, hospitals have employed and invested **(**IT**)** systems such as **(**HISs**)** and Electronic Health Record **(**EHR**)** (Hsiao et al., 2011; Colicchio et al.; 2016, Davis, 1993; Davis, 1989 ; Pöder, Fogelberg-Dahm, & Wadensten, 2011). In addition, health data and information can be transformed from one site to another through electronic services and this is called Telehealth (Tang & Lansky, 2005).

Recently, applying smartphone applications to healthcare services has increased either for healthcare professionals or public users (Silva et al., 2015). However, smartphone applications combine the technology of mobile computing and the technology of communication in a single portable device. With other supportive services such as Wireless, 3G, and 4G services, large and various numbers of applications are supported and adapted in healthcare to support different

services such as medical consultations and services based on patient location (Wu, Li, & Fu, 2011;Silva et al., 2015).

Many researchers have investigated health (IT) adoption and its impact on different healthcare settings. Also, several studies covered the adoption of (IT) in healthcare in the period from 1995 until today (Chaudhry et al., 2006; Bardhan & Thouin, 2013; Colicchio et al., 2016).

Acceptance to use technological interventions and applications is a vital factor to ensure the success or failure of the system (Davis, 1993; Asua et al., 2012). In healthcare, the acceptance of the two types of users including patients and healthcare professionals is important due to the required changes the new system applies to the usual practice. Different factors affect user acceptability and intent to use the new technological system and studying these factors is important for organization development strategies (Broens et al., 2007).

Different models have been used to study the acceptability of the target users to use the new technological systems as a result to technology expansion in different domains including healthcare. Technology Acceptance Model (TAM) is one of those models which has been built by Davis in the 1980s and used to study the extent of user's acceptability and intent to use the technological system and study the external factors that affect user's acceptability. TAM has been structured as a set of variables measuring the perception of the system's usability and usefulness which affect the attitude of the user toward the use of the new system and then the user's intent to use it. Also, using (TAM) as a model in research can provide a better understanding of what making the user accepts the new system or rejects it and how to utilize technology development and design improvement to improve user's acceptance (Davis, 1985; Davis, 1989). In healthcare, a wide variety of researches have investigated the acceptance of users to use healthcare information technology systems using (TAM) (Liu et al., 2013). New healthcare technology systems can only be useful and produce positive benefits when the target users of them are willing to adopt them in their daily practice. Several types of research have been adopted (TAM) as a conceptual framework to study the acceptance and explain the intention of healthcare professionals and the public to use (HIT), (HIS) and (EHR) systems (Holden & Karsh, 2010; Liu et al., 2013).

Recently, health (IT) has been applied in different Palestinian healthcare fields, and the application of it is increasing (Health et al., 2018). Few studies have investigated user acceptability to use health (IT) in Palestine despite the increasing use of health information systems in some fields like medical laboratories and pharmacies (Jabareen, Khader, & Taweel, 2020).

Medicare is one of the Palestinian medical laboratories companies which started using mobile and web applications in providing lab test results to physicians and patients electronically without the need to visit the lab to get the results manually and these applications are considered new interventions in the Palestinian environment (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.). This research tries to explore the extent of acceptability and the factors that affect user’s acceptability to use Medicare’s technological applications by patients and physicians in Palestine, especially in Hebron governorate as an example of the development of healthcare services using the technology acceptance model (TAM).

This kind of research is interesting and relevant to the health informatics field, because one of health informatics’ interests is to understand how to use technology to serve people in the healthcare sector, and mobile technology especially mobile applications are new trends and an effective type of technology. Medicare’s medical laboratories’ smartphone and web applications are connected to Medicare health information network. So, understanding the acceptability of using this kind of technology is very important for the health informatics field and future researches.

1.2. Problem statement

Health information technology (HIT) applications are started recently to be used in the Palestinian environment among the public, patients, and healthcare professionals including physicians, nurses, lab technicians, radiologists, and pharmacists. However, the acceptance of applications’ users especially Palestinian users still not widely and not enough investigated to expand the technological development in different healthcare domains (Jabareen et al., 2020).

For instance, Medicare medical laboratories company is the first of its kind in Palestine that uses information technology (IT) applications to provide lab test results to patients and physicians of patients using mobile and web technologies. There are no previous studies conducted to evaluate

them and measure the extent of their acceptance among Palestinian users as an example of the (IT) applications adoption in the Palestinian health sector (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.).

1.3. Objectives of the study

The main objective of the study is to describe the extent of the acceptance of patients and physicians to use Medicare’s smartphone and web applications to receive lab test results electronically. This research utilizes (TAM) as a theoretical model to achieve the following specific objectives:

1. To describe the main demographic features of the users of Medicare’s mobile application among patients and Medicare’s web application among physicians.
2. To assess the level of perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATU), and behavioral intention to use (BIU) Medicare’s health informatics applications.
3. To determine the type of relationships (positive or negative) between (TAM) variables (PEOU, PU, ATU, BIU), and whether these relationships are statistically significant or not.
4. To identify the external factors that affect the usage of Medicare’s mobile and web applications and assess the impact of them on (TAM) variables (PEOU, PU, ATU, BIU).
5. To assess the impact of using Medicare’s mobile and web applications on the quality of service provided by Medicare labs.

1.4. Research questions

The main research questions can be formulated as:

- What is the level of users’ acceptability to use the mobile and web applications of Medicare medical laboratories to receive lab test results in Hebron governorate?
- What are the factors that could affect the acceptance of patients and physicians to use health informatics technology?

In accordance with the previous objectives, this study will test the following hypotheses:

1- Hypotheses related to TAM variables:

The relationships between (TAM) variables regarding Medicare's mobile and web applications including (PEOU), (PU), (ATU), and (BIU) are hypothesized as follows:

H1: There is a positive relationship between (PEOU) and (PU) of Medicare's applications.

H2: There is a positive relationship between (PEOU) and (ATU) Medicare's applications.

H3: There is a positive relationship between (PU) and (ATU) Medicare's applications.

H4: There is a positive relationship between (PU) and (BIU) Medicare's applications.

H5: There is a positive relationship between (ATU) and (BIU) Medicare's applications.

2- Hypotheses related to TAM variables and external factors:

The (TAM) variables are also affected by other external variables (King & Gribbins, 2002), one of these variables is the experience using technology as Davis with Venkatesh found (Venkatesh & Davis, 2000). Thus, after the literature review is conducted, this research suggests the following external variables:

- The availability of internet at home and workplace which used to access Medicare's mobile and web applications.
- User's self-efficacy in using mobile and web applications.
- Training by Medicare staff to patients and physicians on how to use Medicare's mobile and web applications.
- Interior design of Medicare's mobile and web applications.
- Trust that Medicare's mobile and web applications maintain the privacy of health information.

Those external factors are hypothesized as follows:

H6: There is a positive relationship between the availability of internet at home and workplace and (PEOU) of Medicare's applications.

H7: There is a positive relationship between the availability of internet at home and workplace and (PU) of Medicare's applications.

H8: There is a positive relationship between user's self-efficacy in using mobile and web applications and (PEOU) of Medicare's applications.

H9: There is a positive relationship between user's self-efficacy in using mobile and web applications and (PU) of Medicare's applications.

H10: There is a positive relationship between training by Medicare staff on how to use Medicare's mobile and web applications and (PEOU) of Medicare's applications.

H11: There is a positive relationship between the interior design of Medicare's mobile and web applications and (PEOU) of Medicare's applications.

H12: There is a positive relationship between the trust that Medicare's applications maintain the privacy of health information and (BIU) Medicare's applications.

1.5. Conceptual framework

The conceptual framework (Figure 1.1) was adopted from the original technology acceptance model of Davis (Holden & Karsh, 2010). The framework initiates the 4 main variables of (TAM) including (PEOU, PU, ATU, and BIU) and the relationships between them as shown in figure (1.1). Also, the external factors that could affect the 4 main variables of (TAM) are shown include:

- personal characteristics: users'-self efficacy in using mobile and web applications which affects (PEOU, PU), and user's trust that using Medicare's mobile and web applications maintain the privacy of health information which affects (BIU),
- organizational characteristics: availability of internet at home and workplace which affects (PEOU, PU), and user's training by Medicare's staff on using Medicare's electronic applications which affects (PEOU),
- and information system characteristics: usability of the interior design of Medicare's mobile and web applications which affects (PEOU).

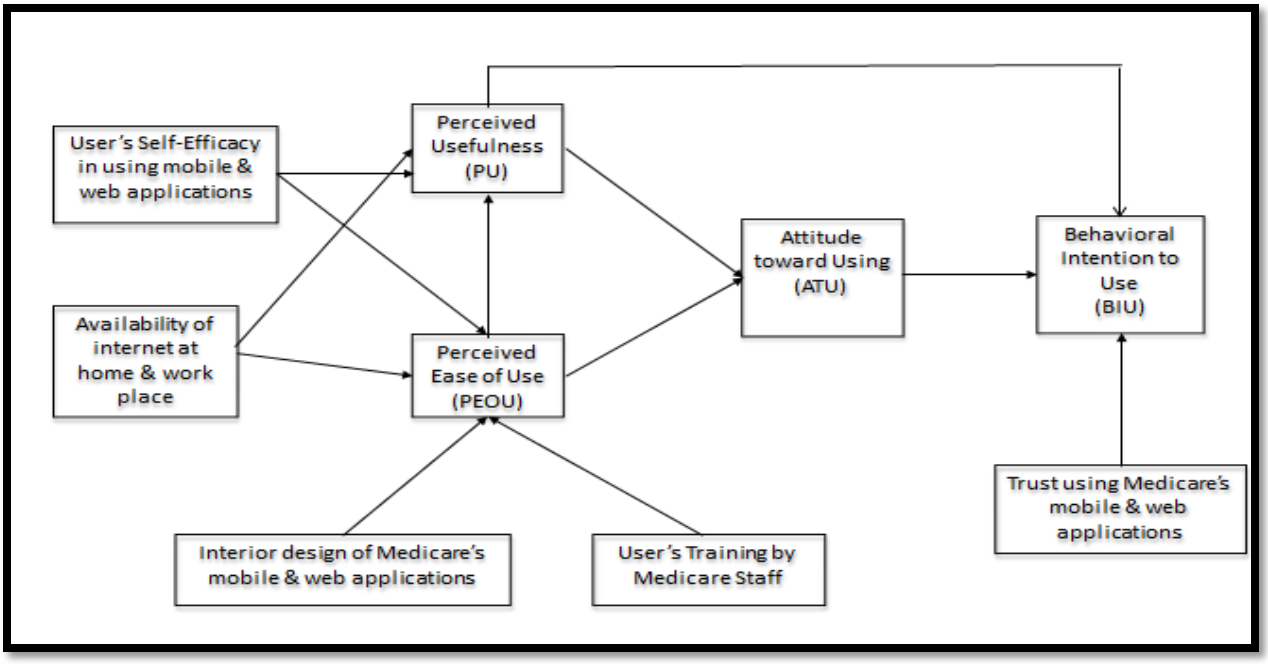

Figure 1.1: Research conceptual framework

1.6. Research significance

Medicare medical laboratories company is an example of the Palestinian medical companies that started using mobile and web applications which are new to be used in the Palestinian culture and the Palestinian healthcare sector. Understanding the nature of acceptability of using this new trend (mobile and web apps) from the point view of its users in the Palestinian healthcare sector is very important to encourage the technological expansion in the healthcare sector in different fields by providing evidence-based recommendations to decision makers about what the technical solutions to solve difficulties faced by the users, and to show a picture about the extent of success or failure of the new health (IT) in the Palestinian context which then encourages developing new applications supporting different fields and functions in the healthcare sector. So, the results of this research can be generalized to the whole other technological applications in the healthcare sector. Further, this research may put the technology acceptance future research on the way in the Palestinian healthcare sector and the methodology used in this study can be utilized by future researches to measure the acceptability of using other technological applications.

1.7. Scope and limitations of the study

- The time scope: this research time scope was from August 1st, 2020 to January 1st, 2021.

- The place scope: this research covered the users of Medicare's mobile and web applications who are receiving lab test results from any of the 4 branches of Medicare medical laboratories company in Hebron governorate including (Hebron, Yatta, Dora, and ad-Dhahiriya).

- The human scope: the population for this research was the patients and physicians who are electronically receiving the lab test results from Medicare medical labs in Hebron governorate through Medicare's mobile and web applications where there are 4 branches.

Chapter two: Literature review

2.1. Introduction

This chapter will include a brief literature review regarding technology adoption in healthcare including (E-Health) adoption, the challenges and barriers facing adoption and expansion of information technology in healthcare, and then a brief and general review about the adoption of mobile and web technology applications in healthcare. Health (IT) adoption in Arab World countries and in Palestine will also take a part in this chapter. Finally and most importantly, an overview of Medicare medical laboratories company and its mobile and web applications are described. This chapter will be by reviewing the technology acceptance model (TAM) and its adoption and use in the healthcare domain, which then leads to a review of some previous studies that have adopted and employed (TAM) in their investigation within healthcare different contexts.

2.2. E-Health

Recently, the health sector and governments worldwide have needed an improvement in providing safe, efficient, and effective services. Thus, the need for health information technology (HIT) adoption has emerged and has become a critical necessity, and governments are in different stages of health information technology systems implementation (Hayajneh & Zaghloul, 2010).

Many developed countries started seeking to employ and invest the latest versions of electronic health (E-Health) and (HIT) tools in their healthcare systems (Marques, Oliveira, & Martins, 2010). To provide higher quality and higher efficiency of healthcare outcomes, it is vital to use computer and health informatics sciences (Benbrahim, Hachimi, & Amine, 2018). For instance, in 2010, several underway efforts to employ (IT) in the healthcare industry were offered by governments' leaders as financial incentives to digitize healthcare systems (Neamah, bin Ahmad, Alomari, Nuiaa, & UTeM, 2018).

Electronic Health as a term is defined by WHO as "*the cost-effective and secure use of Information and Communications Technologies (ICT) in support of health and health-related fields, including healthcare services, health surveillance, health literature, and health education, knowledge, and research*" (Blaya, Fraser, & Holt, 2010). Using electronic health systems helps in the

prevention of medical errors, management of healthcare daily practices, minimization of medical complications, improvement of the clinical research field, increasing of patient safety, and reduction of costs (Cresswell & Sheikh, 2013; Shekelle, Morton, & Keeler, 2006). Also, using electronic health systems and health informatics facilitates the management of medical records, sharing organized information, and helps in clinical decision making which can achieve optimal health outcomes (Badran, 2017).

There are various types of (E-Health) applications including the hospital information system (HIS) to manage patients' health information including demographic, laboratory, radiology, and other biologic information. HIS is a combination of technologies utilizing (HIT) and could be defined as "*the management and utilization of patient health care information*" (Nadri, Rahimi, Timpka, & Sedghi, 2017). HIS is currently considered a main component in any successful healthcare system according to WHO (Taufik Jamil et al., 2012; World Health Organization, 2010). In addition, other applications of (E-Health) including electronic health record (EHR) which focuses on sharing patients' information among healthcare professionals, telemedicine services including telemonitoring of patients by their physicians, computerized provider order entry (CPOE), and (E-Prescription) to electronic transmission of prescriptions among physicians and pharmacists, clinical decision support system (CDSS) which helps healthcare professionals in better-making decisions regarding patients' health status, and mobile health (mHealth) applications (Shekelle et al., 2006; Neamah et al., 2018). All of these systems are important to document and manage patients' personal and medical information including diagnoses, prescriptions, procedures, treatments, and different medical decisions (Silverstein & Foster, 2014).

Communication and interactions among healthcare professionals and patients are also improved by using (HIT) multiple applications (Ash, Berg, & Coiera, 2004). Thus, there is a need to employ a trained workforce for optimal planning and implementation of health informatics and health information systems in different stages (Khader & Jabareen, 2018).

Rapid advances in medical information science and technology have played a fundamental role in taking control over one of the challenges that healthcare professionals have faced which is the ability of to manage the information of the patients (Fleurence et al., 2014). Healthcare sectors realized the role of information in enhancing the quality of services, and then they decided to

adopt information technology (IT) in management processes. Now, healthcare professionals including physicians, nurses, radiologists, lab technicians, pharmacists, and others have different tools to quickly access, share, and use health information to provide the right and optimal healthcare to the right patient (Hung, Chang, Yen, & Lee, 2015).

2.3. Challenges of HIT application

Despite the benefits of (HIT) systems, there are still many challenges in developed countries faced by healthcare professionals and also they are different from those in developing countries (Sood et al., 2008). Health policies affect (HIT) application in each country and in each hospital. However, (HIT) application can succeed or failed depending on technical, human, managerial, and national reasons. Weak policies can lead to problems and privacy and security threats (Alsadan et al., 2015; Hayajneh & Zaghloul, 2010).

In Arab countries, barriers to (HIT) adoption could include lack of funding and resources, poor management, lack of (IT) competent staff, lack of health (IT) experience and knowledge among healthcare staff such as administrators, and social and cultural barriers (Khalifa, 2014; Anwar & Shamim, 2011). In addition, healthcare professionals especially physicians resist adopting and using (HIT) applications and systems in healthcare organizations and this is a critical issue (Hayajneh & Zaghloul, 2010). In accordance with the usability of (IT) systems in healthcare, healthcare professionals in developing countries have inadequate skills in computerized systems use in general, so they need to spend more time on training than others in developed counties. And then, this increases their resistance to new systems (Asangansi O. Farri, 2008;Robert H. Miller & Sim, 2004). But (IT) vendors are somewhat underestimating the usability challenge by designing user-friendly systems like voice recognition, tablets, mobile devices, etc. (Hoffmann, Loser, Walter, & Herrmann, 1999).

Inadequate integration and inconsistency between various health information systems (HISs) and other systems like radiology, laboratory, and pharmacy, lack of national standards and interoperability, and lack of electronic health data exchange are also critical barriers to adopt health information technology systems in healthcare. Also, using both paper and electronic systems wastes professionals' time, decreases productivity, and increases resistance (Mcdonald, 1997; R H Miller, Sim, & Newman, 2003; Sağiroğlu & Özturan, 2006; Anwar & Shamim, 2011). Regarding

healthcare software and hardware, when they are outdated, problems like weak and difficult user interfaces, and slow computer and network devices will appear which then lead to technical problems support (Lorenzi, Kouroubali, Detmer, & Bloomrosen, 2009).

Most human challenges for the adoption of (HIT) systems include (IT) knowledge, lack of specialists in health informatics, lack of motivation, and attitudes of healthcare professionals toward information systems use in healthcare practice (beliefs). So, there is always a need to get a positive attitude from healthcare professionals to accept (HIT) applications use in their healthcare tasks and this could happen through increasing their (IT) knowledge through training (Ochieng & Hosoi, 2006; Borycki, Joe, Armstrong, Bellwood, & Campbell, 2011; Khudair, n.d.). But according to some researches, age is considered as a factor that could have an influence on the allowed time for users' training and learning (Lium, Tjora, & Faxvaag, 2008). Engagement of physicians and other professionals in the activities of designing and implementation of the new technological systems in healthcare is necessary to reduce the errors resulted from using the system and eliminate professionals' resistance which then increases the acceptability to the new system (Dansky, Gamm, Vasey, & Barsukiewicz, 1999).

To overcome the barriers of (HIT) adoption, there are some recommendations from several studies and suggestions to reduce the challenges of (HIT) acquisition. These recommendations include financial support, training programs, (HIT) integration in educational curricula, increase awareness toward the importance of (IT) applications in healthcare, support short term policies and long term policies establishment with regulations supporting ethical use of (HIT) applications, and improve the status of hardware and software of computer and devices used by healthcare professionals to increase the perceived usability of the systems (Alsadan et al., 2015; Khalifa, 2014). Financial rewards also could increase and encourage the usage of hospital information systems and improve the quality of healthcare services (Robert H. Miller & Sim, 2004). Also, Support further researches to identify other barriers and challenges regarding users' acceptance to use new technological systems in healthcare sectors (Prof, Khanapi, & Ghani, 2016).

2.4. Mobile and web applications in healthcare

The world health organization (WHO) has encouraged the adoption of mobile and web technologies in healthcare, where the use of mobile supported by other services like wireless

have transformed the nature of healthcare delivery (Lee Ventola, 2014). In general, mobile healthcare activities in high-income countries such as the European Region are more common than in low-income countries such as the African and Asian Regions (Ryu, 2012).

One of the reasons why mobile technology has advanced in the healthcare industry is the need for better communication among healthcare professionals and patients, in addition to engage patients in their healthcare management. Also, healthcare professionals need quick access to health information in each healthcare setting and mobile technology helps them to do this (Mosa, Yoo, & Sheets, 2012; Moodley, Mangino, & Goff, 2013). Furthermore, information technology that depends on the web can provide better access and enable better integration among various computer applications and resources of healthcare information (Nehra, 2020).

The adoption of (mHealth) is depending on rapid advances in applications, support integration into electronic healthcare services (E-Health), and support continuity of cellular networks (Lee Ventola, 2014). Mobile healthcare (mHealth) services are categorized into several categories including health call centers, emergency management, telemedicine, alerts and reminders, treatment compliance, mobile (PHR), monitoring, surveillance, data access and collection, and medical education (Ryu, 2012).

Mobile applications help in managing patients with obesity, blood pressure diseases, heart diseases, and other chronic diseases through continuous communication between physicians and patients, and self-monitoring especially with increasing ownership of mobile devices among the public (Robinson, 2014). Web applications in healthcare also can facilitate online consultations among healthcare professionals and patients. In addition, web applications can help in online pharmacy that enables patients to identify their symptoms, choose the best medicine that suits their money and disease, and then deliver to home the appropriate medicine (Nehra, 2020). Moreover, mobile technologies in healthcare can help hospitals to reduce costs while giving patients the same level or even enhanced level of patients' care and keep services as affordable to all patients as possible. Telemedicine is one of the (mHealth) services that help patients to access healthcare services from any location. Wearable devices combined with mobile devices are also playing an important role in monitoring and tracking patients especially with critical health conditions and reducing the overall costs of hospital visits (Lurie, 2018). Utilizing (IoT) service,

mobile and web applications now are receiving wide popularity in facilitating sending of notifications from wearable devices to physicians or hospitals. Hospitals are now adopted web and mobile technology in inventory management which then help in operational costs reduction and providing services with a highly competitive price (Nehra, 2020).

Mobile healthcare (mHealth) needs planning, development, and evaluation to be considered as integrated service in the healthcare sector. Evaluation of (mHealth) applications can help in determining cost-effectiveness, helping the public to know about the benefits of (mHealth) applications, and encouraging making appropriate policies. Healthcare information security is really an important and critical issue, so the use of (mHealth) applications and services in its nature needs policymakers and managers of technology and health to make policies to maintain health information security and privacy when it needs transmission and even when it is stored. International standards are needed in addition to special architectures to support policies and partnerships with specialized companies to utilize (mHealth) advantages to enhance healthcare outcomes (Ryu, 2012).

Mobile and web healthcare applications and services are expected to improve continuously, provide more advanced applications utilizing artificial intelligence (AI), and include larger databases to support clinical decision-making and improve patients' self-wellness. In addition, the developing of mobile and web applications in healthcare must keep ethical issues whenever applied (Lurie, 2018; Wallace, Clark, & White, 2012; Mickan, Tilson, Atherton, Roberts, & Heneghan, 2013; Nehra, 2020).

2.5. HIT application in Arab countries

Over the years, (IT) has been successfully implemented in most of the developed countries' healthcare sectors and has been pervasive. In contrast, Arab world countries are still behind in the implementation of successful (IT) in their healthcare sectors as a result of the shortage of financial resources and competency. Although public hospitals receive their funding from governments, their utilization of (IT) applications is not adequate. Besides, the private health settings do not have the required funding to apply (HIT) (Alsadan et al., 2015). In some developing countries, including Arab countries, governments are trying to provide sufficient incentives and investments to healthcare organizations encouraging them to apply (IT) in their practices and help

citizens through providing better services (Gambo, Oluwagbemi, & Achimugu, 2011; Deloitte, 2014). In general, in a comparison between Western and Arab countries, there is a huge gap in the adaption and implementation of information systems in healthcare sectors (ALMULHIM & HOUSEH, 2012).

Progress in the healthcare information system can be realized when the mortality rate is reduced. Thus, Arab countries have tried to manage their healthcare services and reduce the mortality rate ('WHO | World Health Statistics 2010', 2010). For instance, Egypt, Sudan, and Libya had done many initiatives to implement (HIT) in their healthcare sectors but yet they are not as advanced as in UAE and Saudi Arabia (M. Altuwaijri, 2011). A decade ago, there was quite much growth and change in some of the Arab countries' healthcare sectors especially (KSA) and (UAE) (Program & Governance, 2011). Using (HIT) requires up-to-date information, computerized devices, and technologies, and without them, it is nearly impossible to compete with external strengths and improve healthcare sectors (Jones & Groom, 2016). To Saudi Arabia as a perfect example of Arab World countries implementation of (HIT), the government has implemented (IT) in its healthcare sector, and standardized programs in healthcare systems are being used by most hospitals to achieve the goals of technology applications in the healthcare sector (M. M. Altuwaijri, 2008). Also, by using health information systems in Saudi Arabia, best solutions have been found by most hospitals to solve medical and clinical problems, maintained patients health records and administrations practices, and they built a unified network to share patients' information among hospitals and healthcare organizations in addition to the ability to provide patients' treatment online (Al-Zahrani, n.d. ; Alsadan et al., 2015).

Some of the emerging technologies in some Arab countries including telemedicine, bar code applications, (CDSS) and (mHealth) applications, image processing, and communication systems. All of these technologies supposedly improve patient safety and enhance management processes which then improve the general quality of healthcare services (Burney, Mahmood, & Abbas, 2010). In some Arab world countries, the availability of medical records programs that are open source and the programs provided by local companies have facilitated the implementation and development of electronic medical records (EMR), and support costs savings. But, the lack in technical experience has led to failure in its implementation (Alsadan et al., 2015).

Technology application in healthcare sectors in most Arab world countries is essential, but studies indicate that the adoption of it is low or underutilized. There are barriers to adopt technology in the healthcare sector in Arab countries, one of the conducted studies aimed to determine the challenges healthcare professionals faced in 4 developing countries including UAE, Egypt, Saudi Arabia, and Turkey; the results indicate that political regulations, finance, and supply change management are the most challenges in addition to other barriers and challenges including professionals' resistance to change the traditional systems, poor infrastructure, low technical experience, lack of motivation, and poor management (Zayyad & Toycan, 2018; Uluc, 2016).

Despite the barriers and limitations for adopting and utilizing (HIT) in Arab world countries, healthcare institutions should seriously consider the importance of (HIT) adoption in their health organizations and hospitals as future care delivery and research depends largely on it. However, Arab countries should activate collaboration and partnership to exchange experiences and expand benefits (Alsadan et al., 2015).

HIT is cost-effective to provide quality services. Thus, Arab countries need to define supportive strategic plans to successfully implement (HIT) in their healthcare sectors and to eliminate barriers including finance and culture. Also, there is a sufficient need to support scientific research in the fields of (HIT) (Alsadan et al., 2015). Governments should gain public trust in healthcare information systems and technology programs to encourage expansion in healthcare sector improvement, and they should expand the use of healthcare websites and programs utilizing the technologies of cloud storage to ensure that the information is secured and available everywhere (Alsadan et al., 2015). Additionally, there is a need to improve healthcare analysis and statistics, support integration between healthcare systems and international solutions, and train healthcare professionals on how to get adapted to the new systems (M. Altuwaijri, 2011; Neamah et al., 2018).

2.6. Health information system in Palestine

Recently, the health information system (HIS) has been applied to some areas in the Palestinian healthcare sector and still limited to (PHR) systems. Although the implementation of (HIS) applications is increasing, there are still multiple challenges and barriers. (Health et al., 2018)

In a study to evaluate the influence of (HIS) use among healthcare professionals in Palestine, the results of the study could be utilized by academia, government, and the healthcare sector. Experience in using computer systems is important to the usability and to be familiar with any health information (HI) system. Also, the results showed that (HI) systems are used by medical laboratories and pharmacies to do their daily operations. In addition, electronic records, prescriptions are also used in Palestine. There is a nearly good use of telemedicine in Palestine, and the users explained a strong willingness for expansion in using (IT) in their work to facilitate tasks (Jabareen et al., 2020).

In a comparison between Palestine and Jordan regarding the use of (HIS) in their healthcare sectors, Palestinian healthcare professionals "*were more likely to use computers to do their daily tasks*" and then to use electronic records. Users' negative perception of the importance of (HIS) systems is one of the possible reasons for the not widely and limited adoption of it (Hayajneh & Zaghloul, 2010). Also, poor funding, lack of individual engagement, and individuals' qualifications are considered as obstacles to (HIS) implementation in Palestine and Jordan (Alkraiji, El-Hassan, & Amin, 2014).

In accordance with healthcare professionals training on how to use health information systems, researchers concluded that most of the Palestinian healthcare professionals receive training regarding computer skills but they need more training due to their lack of confidence in computer skills especially nurses more than other healthcare professionals (Jabareen et al., 2020). To overcome the challenges for expanding the adoption of (HISs) in Palestine, there is a need to revise medical and health curricula to make (HIT) included, and develop new health information programs (Hayajneh & Zaghloul, 2010). Some universities have started training programs in health and (IT) fields for students to make them ready for the increasing needs for (HIT) adoption in the Palestinian healthcare sector (Jabareen et al., 2020).

2.7. Technology acceptance model

The success of any new (IT) system or its failure is affected by an important factor which is user acceptance (Davis, 1993). In 1989, Davis proposed a model called the technology acceptance model and can be called (TAM) as one of the theoretical models for understanding and

evaluating the acceptance level of user to use the information technology and information systems in different fields and it is considered as a "*gold standard*" (Davis, 1989; Bagozzi, 2007). So, (TAM) is used to explain why the user accepts to use a new technology or reject it and how user acceptance can be improved through (IT) design using two factors: the first factor is the (PEOU) by the user which is "*the expectation that the system is user friendly and easy to use*" (Ammenwerth, 2019), and the second factor is the (PU) which is "*the expectation of a user that the system will be useful for the job*" (Ammenwerth, 2019), and those two factors are affected by other external factors: personal, organizational, and information system characteristics (Hsiao et al., 2011; Ammenwerth, 2019). PU and PEOU are considered as determinants for the user's attitude (ATU) which is "*An individual's evaluative judgment of the target behavior on some dimension (e.g., good/bad, harmful/beneficial, pleasant/unpleasant*)" (Ammenwerth, 2019). And then attitude toward using is in turn a determinant for the behavioral intent to use (BIU) (Ammenwerth, 2019). TAM focuses on two questions: Is the technology useful for me? Also, is the technology easy to use? (Davis, 1993). TAM has limitations such as it works in a voluntary context, not in a mandatory context where the intention to use is not a relevant concept (Karahanna, Straub, & Chervany, 1999; Ologeanu-Taddei, Morquin, Domingo, & Bourret, 2015).

The external factors that the system's (PEOU) and (PU) influenced by them are:

- The organizational factors may involve:
  - To what extent the management supports the development of information systems and attitude toward user satisfaction (Hsiao et al., 2011).
  - Technical capabilities competency among project team, communication skills, and awareness of user needs (Hsiao et al., 2011).
- The personal characteristics factors may involve:
  - Users' self-efficacy when the users believe that to complete their tasks they have to apply (IT) systems (Hsiao et al., 2011).
  - Compatibility between user's experience, needs, prior values, and system applications (Hsiao et al., 2011).

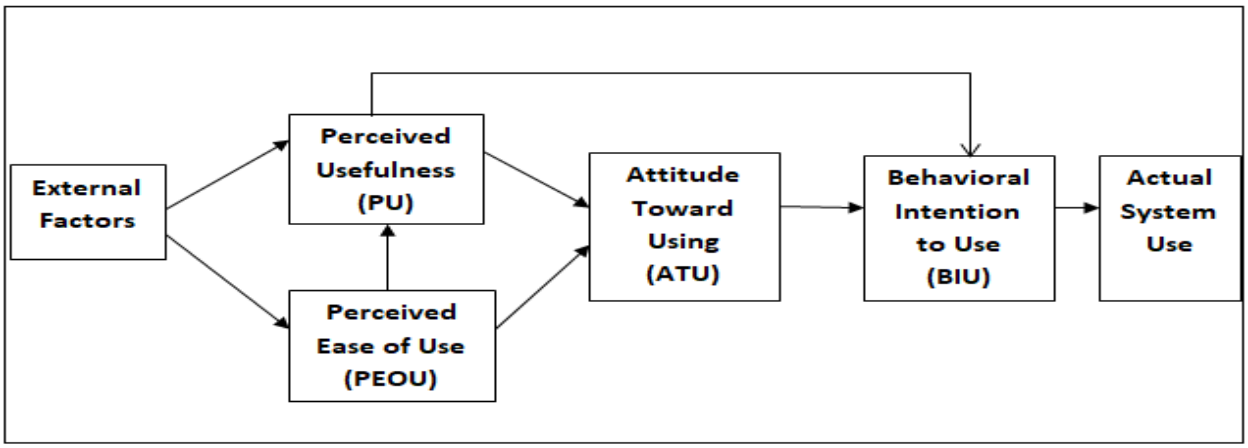

Figure 2.1: Original technology acceptance model (Holden & Karsh, 2010)

ICT is a combination of the technologies of computing and telecommunication and it is influenced by multiple drivers including technology, economy, organization, and persons. Scholars from the 1960s-2014 have conducted several types of researches to study the intent, attitudes, and behaviors while adopting of several new technologies (Almeida et al., 2017).

2.8. TAM adoption in healthcare

The application of (ICT) in the healthcare sector needs efforts to be sufficiently meeting the needs of individual users and the environment to prevent putting patients at risk (Catwell & Sheikh, 2009). Therefore, there is a need to study the influence of (ICT) adoption on technical, nontechnical, and individual levels (Black et al., 2011). Assessment of the effect of (HIS) implementation from the point view of its users is considered as one of the effective methods of evaluation (Aggelidis & Chatzoglou, 2008). Currently, studies regarding technology acceptance in different fields including the healthcare sector became a mature field in the researches of information systems (Venkatesh, Morris, Davis, & Davis, 2003).

EHR is the most common technology used in healthcare, and the adoption of (EHR) is affected by some factors including users' perceptions. (TAM) is adopted to understand and explain the users' acceptability including (patients and healthcare professionals) to use any new technological system in healthcare. The most common area in healthcare where (TAM) was used to study its acceptance by users is (ICT) which includes different applications: telemedicine, (EHR), and (mHealth) (Rahimi, Nadri, Afshar, & Timpka, 2018).

Studies suggested that there is no optimal (TAM) version that could be used for all healthcare applications and researches and there are still some areas that do not adopt (TAM) in their studies. Thus, some extensions have made to the original (TAM) version utilizing various components focus on a user's intent to do a behavior and derived from the theory of planned behavior (TPB) and theory of reasonable action (TRA) which are social psychological theories (HALE, HOUSEHOLDER, & GREENE, 2012), and technology use while all other required variables are added to fit all items of the studied healthcare environment including self-efficacy, training, job relevance, experience, compatibility, habits, and facilitators. 1999-2017, (ICT) applications in healthcare were frequently studied using (TAM) when the acceptance of these applications in healthcare was really a major challenge (Rahimi et al., 2018).

Application of (TAM) to the healthcare sector was initially for (ICT) systems regarding tasks dedicated such as (EHR). As a result to apply (TAM) in some healthcare systems, it was noted that clinical users will accept the new technology if they realize that it will help in improving performance and efficiency (Handayani et al., 2017). Also, factors that affect healthcare users' acceptability to use the new system such as (EHR), (HISs), telemedicine, and other (ICT) systems are identified including usefulness, self-efficacy, quality of the system and information, security and privacy concerns, physicians' autonomy, and organizational and cultural factors (Rahimi et al., 2018). In accordance with telemedicine, policymakers in healthcare are still investigating the reasons for the difficulty of expansion of institutionalizing applications of telemedicine. Thus, telemedicine applications have attracted the interest of researchers to use (TAM) to expand its organizational adaptation in healthcare (May et al., 2003; Rahimi et al., 2018).

2.9. Overview of Medicare medical laboratories company

Medicare is a name for a Palestinian medical laboratories company which has been established in 1995 and has branches in many governorates including Hebron, Bethlehem, Nablus, Tolkarm, Ramallah, Jenin, and Jericho. It has a quality control system to ensure that all of its services and test results are accurate and its team has developed computerized programs to link all branches through a unified information network that enables patients to receive their test results from any Medicare branch (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.).

In addition, Medicare medical laboratories company has utilized (HIT) and developed mobile and web applications in 2016, where the patient can obtain test results via a smartphone application which is called “Medicare” and physicians can also view and obtain copies of the test results of their patients via Medicare’s web application using their accounts provided by Medicare (IT) staff. Also, patients and physicians can receive their test results through e-mail, and WhatsApp (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.).

To patients, “Medicare” is a smartphone application in the Arabic language which Medicare medical laboratories started to use to allow the patients to insert their username and password provided by Medicare (IT) staff depending on a computerized system to receive the laboratory test results directly when they are finished (figure (2.2)), so there is no need to visit any branch of Medicare laboratories to receive the paper test results manually (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.).

Figure 2.2: Medicare smartphone app. Screen shot 1

In addition to viewing the list of new and previous lab test results of the patient which is chronologically ordered, the application also provides other services such as information about Medicare branches and their locations, their working hours, and contact information as shown in figure (2.3) (‘مختبرات ميديكر – فحوصات أدق لك ولعائلتك’, n.d.).

Figure 2.3: Medicare smartphone app. Screen shot 2

The application provides searching for physicians as shown in figure (2.4), and offers and campaigns from Medicare Laboratories (‘مختبرات ميديكير – فحوصات أدق لك ولعائلتك’, n.d.).

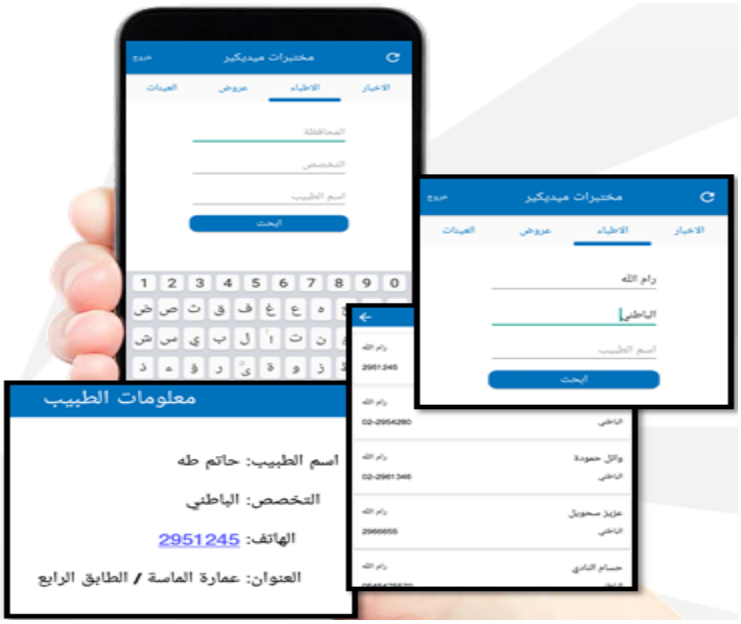

Figure 2.4: Medicare smartphone spp. Screen shot 3

In addition to the “Medicare” smartphone application, there is a web portal (portal.medicare.ps) as shown in figure (2.5), the user can insert the username and password to view new and old lab test results (‘مختبرات ميديكير – فحوصات أدق لك ولعائلتك’, n.d.).

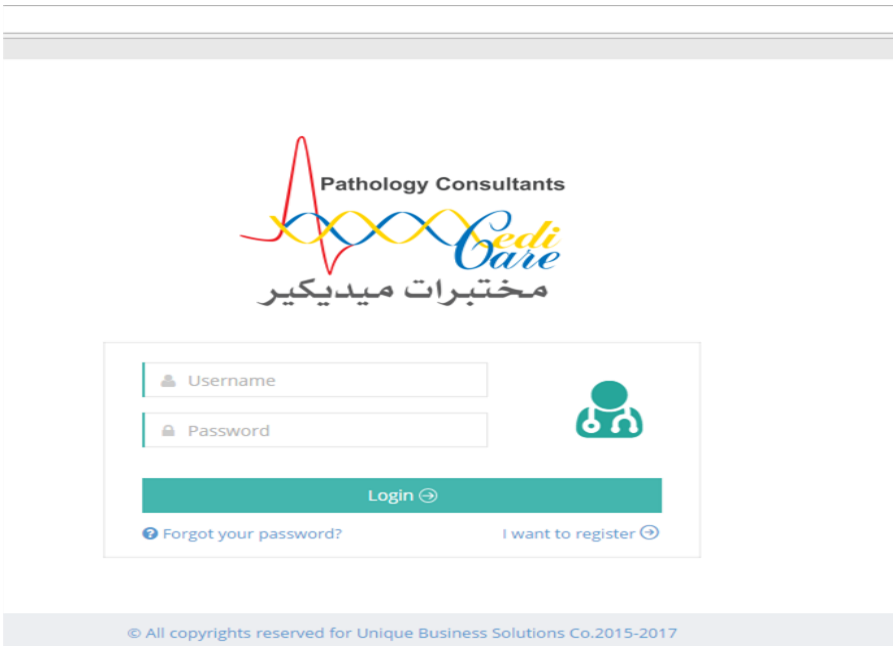

Figure 2.5: Medicare's website interface. Screen shot 4

Physicians can search patients' names, view their test results, and receive a copy of test results of patients at the same time (at the same time when the lab send it to patients) via their accounts on the web application of Medicare medical laboratories company (Medicare's Portal), and then provide the necessary services to their patients depending on the lab test results (' – مختبرات ميديكر فحوصات أدق لك ولعائلتك', n.d.).

2.10. Previous studies

The technology acceptance model (TAM) has gained substantial popularity in technology acceptance research (Ammenwerth, 2019). Now it has become widely used by researchers to describe, measure, explain, and predict user acceptance or user rejection for the use of new (IT) applications and the development of new systems (Hsiao et al., 2011). In healthcare, a study that reviewed the researches on Technology Acceptance Model in health information systems in 2018, 134 articles were retained which identified the areas where (TAM) is utilized and these areas are: (EHR), telemedicine, and health mobile applications (Rahimi, Nadri, Afshar, & Timpka, 2018). This study concludes that the application of (ICT) in healthcare is the field that has been investigated using (TAM) more than other health fields, which means that the user's acceptance of those applications was the main challenge for developing health services, and the study also indicates that there are still areas that need expansion and improvement which in turn needs to

increase (TAM) performance (Rahimi et al., 2018). Theories frameworks that explain user acceptance or predict user acceptance to use health information technology have received an important interest as a result of increasing attention from researchers to study the reactions of the end user's to health information technology (Holden & Karsh, 2010). Another study that talked about the past and future use of (TAM) in healthcare in 2010; 20 studies about using information technology in patient healthcare by clinicians were reviewed and the results demonstrated that there is an important future direction for (TAM) adapting specifically in the healthcare context (Holden & Karsh, 2010). Purchasers of (IT), designers and others involved with information technology were recommended to use (TAM) to improve the design of projects, system implementation and training, and other activities (Holden & Karsh, 2010).

There are many external factors that affect the user acceptability to use health information systems and many studies investigated these factors; one of those studies was in a French university hospital in 2015 and the goal of it was to examine the main concepts of (TAM) (PEOU, PU, self-efficacy, organizational support) for the care staff of the hospital information system using a questionnaire of open and closed questions (Ologeanu-Taddei et al., 2015). The content analysis highlighted another three factors influencing user acceptability and explained the correlation between (TAM) main concepts and medical occupations, ergonomics, and errors in the documenting process (Ologeanu-Taddei et al., 2015). Also, this study recommends that the items of the questionnaire driven from (TAM) should be completed by more items of (HIS) including care treatments, laboratory results, and medical observations (Ologeanu-Taddei et al., 2015). A study was conducted in 2017 in some Nigerian hospitals to explain the factors affecting the decisions of healthcare professionals and their intent to use (E-Health) applications. The results have agreed with other studies as the intent of healthcare professionals' to use (E-Health) systems and applications was influenced significantly by users' beliefs, systems' usefulness, users' willingness, and users' attitudes. Other external factors include the low level of literacy and experience regarding (E-Health) technologies, poor policies for organization management, and poor users' motivation (Zayyad & Toycan, 2018).

Many researchers adopted (TAM) in their studies in different areas such as (EHR), telemedicine, and mobile health applications (Rahimi et al., 2018). TAM theory was applied to explain and understand the user acceptance to use telemedicine and telemonitoring systems. In 2012, one of

the studies that investigate the acceptance of telemonitoring system was conducted in primary care in Spain for patients who need chronic care (Asua, Orruño, Reviriego, & Gagnon, 2012). The purpose of the study was to support the extension of (TAM) into the entire healthcare system and to examine and measure the psychosocial factors that influence the acceptance of remote monitoring among healthcare professionals (Asua, Orruño, Reviriego, & Gagnon, 2012). The study concludes that (TAM) was successfully able to predict the behavioral intent of users' to use the system and the most important variable that affects and has a prominent role in increasing the intent to use the new system by the healthcare professional is the organizational facilitators (Asua, Orruño, Reviriego, & Gagnon, 2012). For blood pressure; researchers know a little bit about patient's acceptance for some of the health care services, but they found that telemonitoring from home has a positive impact on blood pressure control and on routine primary clinical care. A study was conducted in Malaysia in 2016 to use (TAM) in exploring patient's acceptance to use a telemonitoring system for blood pressure control, 17 patients participated in interviews that were audio-recorded (Abdullah et al., 2016). Patients found the remote service of monitoring blood pressure easy to use but they had few problems with the perceived usefulness, they also needed interpretation in blood pressure readings, more physicians' notes and feedback, and they recommended some improvements and suggestions about the system's functionalities to further improve interactions (Abdullah et al., 2016). In 2012, a study was conducted to develop, implement, and assess a telemedicine service "TeleStroke", where in stroke treatments; remote healthcare services can reduce time and physical barriers and "TeleStroke" connects stroke treatment centers with other centers and practitioners (Parra et al., 2012). The evaluation of "TeleStroke" use and acceptance among medical professionals was conducted using a web-based questionnaire depending on (TAM) (Parra et al., 2012). The results of content analysis of the questionnaire indicate that the participants positively evaluated the acceptance of "TeleStroke" and confirmed the role of it in receiving effective treatment where it was previously impossible because the transfer of patients to hospitals required more time (Parra et al., 2012).

For quality improvement and cost reduction in healthcare, a study was conducted in 2013 to determine to what extent the patient will accept to use an internet-based telehealth care implementation through a personal web-based health record (Liu et al., 2013). This study adopted (TAM) using a questionnaire to examine the user's intent to use the system and the factors that influence it. The results of the study concluded that patients showed a fairly high intent to use

(PHR) and that the patient-physician relationship had a significant influence on their behavioral intent to use the system (Liu et al., 2013). The study confirmed that the patient-physician relationship has a prominent role on perceptions to the use of healthcare (IT) by the patient and it suggested that hospitals should strengthen the patient-physician relationship and its quality, and enhance the (PU) of (PHR) to increase the patients' intent to use (PHR) (Liu et al., 2013). Another study was conducted in 2015 to test using of electronic (PHR) by the healthcare professionals' for management of their health, where there is no evidence available, so the study focused on nurses' use of personal health records (Gartrell, Trinkoff, Storr, Wilson, & Gurses, 2015). The study used a convenient sample consisted of nurses from one hospital in Maryland and Washington (Gartrell et al., 2015). The study concluded that the nurses who use (PHR) can play an important role in improving patient education, maintaining (PHR) design, and they can also serve as critical references while working and being with their individual patients (Gartrell et al., 2015). Another study aimed to identify the factors that influence the acceptability of a system to support decisions for pain management (PM-DSS) from the point view of nurse anesthetists conducted utilizing a structured questionnaire depending on (TAM) main concepts which distributed to 101 nurse anesthetists working in a hospital. The study found that the quality of information into (PM-DSS) which had a critical role in system development, self-efficacy in using the computer, and organizational structure significantly affected (PM-DSS) usefulness by nurse anesthetists. The usability of (PM-DSS) also significantly affected by the quality of information. And then the system's usability and usefulness significantly affected the acceptance of nurse anesthetists to use (PM-DSS). The findings provided useful suggestions and recommendations leading to enhance and improve (PM-DSS) development for the system designers and implementers (Hsiao, Wu, & Chen, 2013).

A study used (TAM) to evaluate a spoken dialogue system (SDS) to use during endoscopic examination for recording observations in 2003 (Barker, Van Schaik, Simpson, & Corbett, 2003). The theoretical framework of (TAM) explains the determinants that affect the user's acceptance to use the computer and affect the perceived usefulness such as user's experience, system's performance, and speed, etc. (Barker et al., 2003). This study applied (TAM) which indicated that clinicians highly accepted the usage of (SDS) technology during an endoscopic examination for recording clinical observations, and rather than endoscopic observations recording using paper or keyboard; they preferred to use (SDS) (Barker et al., 2003).

In 2019, a study was conducted using (TAM) to describe the intention of older adults to use the patient portal "My Health Manager" for multiple chronic conditions, in addition to describe the user interface and user experience (Portz et al., 2019). As a result, older adults demonstrated that the portal "My Health Manager" saved time and money, provided relevant health information, and enhanced patient-provider communication (Portz et al., 2019). The study concluded that older adults were interested to use health portals and the advantages provided in them, also there was an opportunity to engage the adults better in their health management taking into consideration that system must be useful and easy to use (Portz et al., 2019).

In accordance with the advanced usage of (IT) in the health sector, the most valuable tool which has emerged and used in healthcare to support providing patient's services is mobile Health (mHealth) (Hoque, 2016). A study in Bangladesh in 2016 to understand the acceptance of users to adopt (mHealth) in developing countries and to investigate what affects (mHealth) adoption using (TAM), therefore the data were collected from 250 participants (Hoque, 2016). Policymakers and mobile purchasers and designers could benefit from the results of this study to increase user acceptability to use (mHealth) services to the highest level, where the results demonstrated that (TAM) main concepts (PU, PEOU) of (mHealth) significantly and positively affected the intent to use and adopt (mHealth) services, and the gender as an external factor strongly affected the use of (mHealth) (Hoque, 2016).

Many studies investigated the usage of mobile applications in healthcare. One of those studies was conducted in 2019 to design a mobile application used to monitor and evaluate patients with Alzheimer's disease (Chávez, Borrego, Gutierrez-Garcia, & Rodríguez, 2019). This study used (TAM) to understand the user acceptability of using the mobile application (Alzheed) to monitor Alzheimer's patients in day center's using questionnaires to health care professionals and undergraduate students who were involved in (Alzheed) design (Chávez et al., 2019). The results of this study showed that participants from healthcare professionals perceived the application as it would be extremely usable and useful, but the other participants perceived the application as it would be quite usable and useful (Chávez et al., 2019). So, the study concluded that the cooperation between healthcare professionals and (IT) professionals in the design process leads to the prevention of resistance to change, meeting the needs of users which achieve better usefulness from the application. Also, when the users of the (mHealth) application evaluate it, this helps to

enhance and promote the usability of the application (Chávez et al., 2019). Patients who suffer from the frozen shoulder "*show limited shoulder mobility with pain and it severely reduces the quality of life and the ability to work."* were studied in 2017 to evaluate the feasibility of an application developed to use by mobile to support these patients by providing app-based exercise instructions at home (Stütz et al., 2017). The study was conducted on five patients for three weeks using a questionnaire on (TAM) concepts including application usefulness and application usability, and patient satisfaction. The results showed a high acceptance and high usability of the application which then indicated the feasibility of the (mHealth) intervention (Stütz et al., 2017). In 2015, a study was conducted to determine the external factors affecting the acceptability of users to use a mobile application for managing obesity, so the application was used for 2 weeks by 94 users who intended to manage their obesity and control their weight, and then they completed a survey to determine the factors that affect their acceptance (Jeon & Park, 2015). The results showed that the user's behavioral intent to use the application was affected by the (PEOU), application usefulness, and compatibility. Also, the (PEOU) was significantly affected by technical support and training (Jeon & Park, 2015). The study recommended that future studies should analyze the factors that affect general healthcare consumers' acceptance of applications and cover other chronic diseases (Jeon & Park, 2015).

Previous studies in the Arab world

A systematic review was conducted in Gulf Cooperation Council (GCC) region to understand the perceptions toward adopting (EHR) in healthcare sectors from the perspectives of healthcare professionals to take proper steps, strategies, and training toward (EHR) implementation.

The results identified the positive and negative perceptions toward (EHR) adoption as following: the positive perceptions were depending on the benefits of (EHR) in healthcare practice including efficiency, increased quality, communication, and availability of information. On the other hand, the negative perceptions were influenced by challenges, risks, privacy and security issues, and high implementation costs. Also, computer literacy, usability, and usefulness of the system affected professionals' perceptions, and also they were affected by age. The study concludes that when the user perceives the new system in healthcare positively, the adoption of it in the Gulf region will be facilitated (B. Alanazi, Butler-Henderson, & Alanazi, 2020). In a study to

measure the perceptions of Saudi physicians and determine the factors that affect their acceptability to use (CDSS) as a new system, the results of the study suggested the determinants that affect the physicians' attitude and intent to use the system and these determinants are: performance and effort expectancy including reduced time, errors and cost, facilitators regarding training and workshops, the accuracy of diagnosis, and patient confidence (Aljarboa, Miah, & Kerr, 2019). Another study was conducted in 2015 in UAE using (TAM) main concepts (ease of use, usefulness) with external factors including security and trust to search the factors that influence user's intent to use (mHealth) services technology for receiving general health services (Alloghani, Hussain, Al-Jumeily, & Abuelma'Atti, 2016). 144 health users and professionals participated in a survey questionnaire, and this study showed that clinics and hospitals (both governmental and non-governmental) had no prior knowledge with using (mHealth) and from the validation of the study's proposed hypothesis, usefulness, trust, usability, and security were directly influencing the user's behavioral intent to use (mHealth) services (Alloghani et al., 2016). Another study was conducted in 2019 in the Kingdom of Saudi Arabia using (TAM) to determine the acceptance of (IoT) technology for the health care sector (M. H. Alanazi & Soh, 2019). To study the acceptance of using (IoT), they proposed a new model for (TAM) to include other external factors and then they studied the relationship between those factors and their effects on user's acceptability such as privacy concerns and cost which significantly predicted intent to use (IoT). Also, perceived convenience, and perceived connectedness which was found as it did not have an impact in predicting (BIU), and there was no correlation between gender and (BIU) (M. Alanazi & Soh, 2019). In 2013, a study was conducted in Jordan to investigate the intentions and expectations to the introduction of implementation of (mHealth) information systems using (TAM) to explore the external factors that could affect the user's intent to use (mHealth) (Jaradat, Moh', & Smadi, 2013). The study concluded that the systems' (PEOU) affect the intent of the user to use (mHealth) information systems the most. It suggested a model to help in understanding the (mHealth) systems in Jordan (Jaradat et al., 2013).

Previous literature talked about the adoption of (TAM) in different fields in the health sector include (EHR), (IoT), smartphone and web applications, and telemedicine to serve people in different conditions, but none of them talked about the adoption of (TAM) to test the acceptability of patients and healthcare providers to use smart applications in medical laboratories field and there is a lake of studies around the world. Medicare started using mobile

and web applications which are new for use in Palestinian society, and there are no studies conducted to evaluate them and measure the extent of their acceptance among Palestinian users as an example of (IT) applications adoption in the Palestinian health sector.

2.11. Summary

Health information technology (HIT) adoption has emerged and implemented in most countries to provide higher quality and higher efficiency of outcomes. There are various types of health (IT) applications such as (HISs), (EHR), (CDSS), (CPOE), telemedicine, telemonitoring, and (mHealth). Despite the success of (HIT) systems, there are still many challenges facing their adoption. Mobile technology has advanced in the healthcare industry for better communication and to engage patients in their healthcare management. Arab world countries are still behind the successful implementation of health (IT) systems as a result of a lack of financial resources and competency. But some countries like Saudi Arabia and (UAE) have made successful (HIT) systems compared to other Arab countries. Recently, health (IT) has been applied to some areas in the Palestinian healthcare sector, but there are still challenges and barriers. TAM is a model that has been adopted in several types of health researches as a conceptual model to investigate the acceptability of users (patients and healthcare professionals) and the factors that affect their intent to use a new technological system such as (EHR), (CDSS), (HIS), mobile different applications. Using (TAM) in different researches in healthcare identifies several factors affecting user acceptability, some of these factors are self-efficacy, user confidence, willingness and trust, usability and accuracy, organization and environment facilitators such as physician and patient relationship, security and privacy concerns, quality and efficiency, and training. The literature indicates that there are still areas that need improvement and technological expansion which encourage the use of (TAM) and other technology acceptance models in future researches. Medicare's mobile and web applications are a new trend in Palestine especially in the medical laboratories field, and to encourage the technology adoption in the Palestinian society there is a need to study user's acceptability to use like these applications. So, Medicare's mobile and web applications are taken as an example in this research to study Palestinians' acceptability to (HIT) applications.

Chapter three: Methodology

3.1. Introduction

To measure the extent of patients' and physicians' acceptability to use Medicare's mobile and web applications to receive lab test results electronically and to identify the external factors and their impact on patients' and physicians' acceptability level, this study used a descriptive methodology which is described in this chapter as the following subsequent sections: study setting, study population and sample, study design, study instrument, data collection procedure, data analysis, and ethical considerations.

3.2. Study setting

The study was conducted in Hebron governorate which is located in the south of West Bank. The specific setting for the study was the Medicare medical laboratories branches where there are 4 branches; Hebron, ad-Dhahiriya, Yatta, and Dora.

3.3. Study population and sample

The study population is the patients and physicians who deal with Medicare medical laboratories branches in Hebron governorate where:

The inclusion criteria for the first group of research population were the physicians who are using Medicare's website (portal) to get test results of their patients from the Medicare's lab information system. According to information provided by Medicare's quality management unit, the number of physicians who are using Medicare's web application in Hebron governorate is almost 30. The exclusion criteria were the physicians who did not use Medicare's website (portal).

The inclusion criteria for the second group of research population were the patients who are using the "Medicare" smartphone application to get their test results from the Medicare's lab information system. The exact number of patients who are using the "Medicare" smartphone application in Hebron governorate is unknown but it is almost 500 active users. The exclusion criteria were the patients who did not use the "Medicare" smartphone application.

3.4. Sampling technique

In this study, the sample was considered as a subset of Medicare's mobile and web applications users in Hebron governorate. Approximately, 113 users (patients and physicians) participated in this study.

The researcher could not get the exact number of patients who use the "Medicare" mobile application. Thus, the researcher had to distribute visits to the 4 branches of Medicare medical labs and ask each coming visitor if he/she uses Medicare's smartphone application to receive lab test results electronically or not. Then, the sample was a purposeful sample. The sample size of patients was 83 from the 4 branches of Medicare medical labs in Hebron governorate.

But the researcher could get the number of physicians who are using Medicare's website to get lab test results in Hebron governorate and it was 30, as Medicare's laboratories company quality management unit provided the researcher with the number of physicians who are using Medicare's website and their names in Hebron governorate. Then, the sample size of physicians was 30 which was the whole number of them.

3.5. Study design

The study is quantitative and surveyed user's (patients and physicians) perceptions, attitudes, and behaviors toward using the electronic mobile and web applications of Medicare medical laboratories company to receive lab test results. The study design is descriptive cross sectional. Data collection was conducted between 9th of September to 20th of October, 2020.

3.6. Study instrument

The study utilized a self-administered questionnaire (Appendix 2) which was adopted from (TAM) measurements and variables and the extensive literature review. The elements of the questionnaire were used with some modifications to fit the research concepts and objectives depending on Medicare's mobile and web applications characteristics and use. The questionnaire was primarily in English language and then translated to the Arabic language to suit the targeted group of users who are Arabic native speakers (patients & physicians in Hebron governorate). The questionnaire was then evaluated by researchers from different specialties

including computer science, health, and research (Appendix 3). After that, the questionnaire was tested on a pilot of 11 patients and physicians and the required modifications were made.
The questionnaire consisted of 3 parts:

A. **Demographic and personal data:** this part of the questionnaire consisted of the following items which are gender, age, place of residence (City/Town), and monthly income to the whole family. Then, the participants should choose their description (Patient or Physician), and based on their response, they were directed to a set of questions:
   - If the description is Patient, then they were directed to answer the educational level and occupation.
   - But if the description is Physician, then they were directed to answer the medical ranking (general, specialist), and years of experience.

   Also, other personal data included in this part of the questionnaire were:

   - Is the Internet available at workplace/at clinic?
   - Is the Internet available at home?
   - Do you have a computer/laptop?
   - Do you have a smartphone?
   - Do you use the 3G service?
   - Do you have the knowledge of using smartphone or web apps?
   - Number of using the internet per day?
   - In addition to the “Medicare” app, do you use other e-health apps? If the answer is “Yes”, how many e-health apps do you use?
   - Is there any reason that prevents you from using smartphone or web health apps? If the answer is “Yes”, mention the reason?
   - Do you trust the use of health information technology or e-health apps?
   - The length of using the “Medicare” app per month?
   - To what extent do you use the “Medicare” app?
   - How would you like to receive the lab test result?

- Do you have an account for the following apps? Email, Facebook, Twitter, Instagram, Health Informatics

The 2 items (Is the internet available at workplace/at clinic, Is the internet available at home) were hypothesized as positively affect (PEOU, PU).

B. TAM variables: this part of the questionnaire consisted of a set of items distributed into 4 sections to measure the following (TAM) variables as a research model for the current study:

1) PEOU utilizes 11 items.
2) PU utilizes 14 items.
3) ATU utilizes 9 items.
4) BIU utilizes 2 items.

The 11 items of (PEOU) contained 2 items, the first one is (I have been trained enough to use the application by Medicare lab staff) and this item was hypothesized as positively affects (PEOU). And the second item is (I have sufficient experience in using the web and mobile applications, i.e. User's self-efficacy) which was hypothesized as positively affects (PEOU, PU). Also, The 11 items of (PEOU) contained 1 item which is (The interior design of the application is clear and comfortable) and this item was hypothesized as positively affects (PEOU).

In addition, to measure the effect of using Medicare's mobile and web applications on the quality of services provided by Medicare's medical laboratories company, the 14 items of (PU) contained 6 items used to measure the effect on the quality of service (Using the application enables me to get lab test result more quickly, Using the application saves the effort to get lab test result, Using the application enables diagnosing of the patient more quickly, Using the application helps back up lab test results files, Using the application facilitates communication with lab through information provided about branches and Telephone numbers, Using the application increases the quality of lab service**).** All of the previous 6 items were used to assess the quality from several domains including timeliness, availability of information, and better communication.

Further**,** the 9 items of (ATU) contained 1 item which is (I trust the application maintains the privacy of health information) and this item was hypothesized as significantly and positively affects (BIU). The following table (3.1) shows all items of (TAM) variables.

Table 3.1: Items of TAM variables in the questionnaire

Section 2.1: Perceived Ease of Use (PEOU)	
1	Learning to operate the app. has been easy for me
2	**I have been trained enough to use the app. By Medicare lab staff**
3	**I have sufficient experience in using web and mobile applications**
4	My interaction with the app. is clear & understandable
5	I find the app. is enjoyable to interact with
6	**The interior design of the app. is clear and comfortable**
7	It is easy for me to become skillful at using the app & navigating it.
8	I find it easy to get the app. to do search
9	The app. works without errors
10	I find it easy to get the app. to show lab test result
11	I find the app. easy to use
Section 2.2: Perceived Usefulness (PU)	
1	**Using the app. enables me to get lab test result more quickly**
2	**Using the app. saves effort to get lab test result**
3	**Using the app. enables diagnosing of patient more quickly**
4	**Using the app. helps back up lab test results files**
5	**Using the app. facilitates communication with lab through information provided about branches & Telephone numbers**
6	**Using the app. increases the quality of lab service**
7	The app. does not misuse patient's information
8	I find it easy to understand test result & medical definitions through the app.
9	Lab test result is true & accurate through the app.
10	I benefit from Medicare labs offers & campaigns through the app.
11	I have received test result on time through the app.
12	I find the app. useful in my stressful work periods
13	Perceived ease of use of the app. increases perceived usefulness of the app.
14	I find the app. useful
Section 2.3: Attitude Toward Using (ATU)	
1	I feel comfortable while using the app.

2	I enjoy discovering new features of the app.
3	I prefer the electronic way of receiving lab test result
4	I prefer receiving paper lab test result manually beside receiving it through the app.
5	I use the app. whenever I need it
6	**I trust the app. maintains the privacy of health information**
7	I search the app. upon receiving the result
8	I am satisfied with the app.
9	I realize that adding electronic apps to the health sector is useful
Section 2.4: Behavioral Intention to Use (BIU)	
1	I recommend others to use the app.
2	I intend to use to use the app. continuously

C. **Qualitative open-ended questions:** participants were asked whether or not they had problems using Medicare's mobile and web applications, and if they wanted to add extra comments about using Medicare's mobile and web applications.

Validity and reliability

As for **validity**, the questionnaire was validated by examining the entire instrument and providing comments and opinions on questionnaire structure and content by a group of expert researchers from different specialties including computer science, health, and research (Appendix 3). After that, some comments were taken into account after their review and discussion with the supervisor, and then the amended questionnaire was tested on a pilot survey of 11 patients and physicians and the required modifications were made.

As for **reliability** among questionnaire items, it was estimated using Cronbach Alpha which is "*a measure of the internal consistency that describes the extent to which all the items of a scale or test measure the same concept or structure*" (Hair, J.F., Anderson, R.E., Tatham, R.L., Black, 1998; Tavakol & Dennick, 2011). There is internal reliability when (Cronbach Alpha value > 0.7) as studies considered. If the number of items used to measure or assess a particular factor such as (PEOU, PU, ATU, BIU) is less than 10, the internal reliability is when (Cronbach Alpha value > 0.5) (Pallant, 2016; Sekaran, 2003).

As presented in Table (3.2), the reliability of all (TAM) main measures ranging from 0.647 (> 0.5) to 0.870. (> 0.7). The overall reliability is (0.926), thus it was considered that there is an internal consistency between the items of (TAM) measures and then the survey is reliable.

Table 3.2: Instrument's reliability, Cronbach Alpha

Scale	Cronbach's Alpha	Number of Items
PEOU	.864	11
PU	.870	14
ATU	.647	9
BIU	.699	2
Overall Reliability	.926	36

The questionnaire was written in Arabic language to enable the target users (patients & physicians in Hebron governorate) to answer its items easily.

3.7. Data collection procedure

The permission to conduct the study was received from Medicare's medical laboratories company administration (Appendix 5). One of the challenges the researcher faced was that Medicare's laboratories company administration refused to provide the researcher with a list of patients' names and contact information who use the "Medicare" mobile application to contact them to obtain their responses due to privacy concerns. But they accepted to provide the researcher with a list of names of the physicians who are using Medicare's website to get lab test results in Hebron governorate.

For patients, the researcher distributed visits to Medicare 4 branches and each visit was for almost 5 hours a day more than one time within the period (9/9/2020 – 20/10/2020) and stayed in the center waiting for the incoming visitors (patients) to ask them if they use the "Medicare" smartphone application or not. If they use the application, the researcher manually distributed the questionnaire to them and explained the research objectives before obtaining their agreement to answer the questionnaire. The researcher faced another challenge, which was that the daily number of incoming visitors who used the "Medicare" smartphone application was very small and was 5 or fewer visitors per day. Also, Medicare directors in Dora and Yatta branches were the data collection team who were trained by the researcher to distribute the questionnaires and

explain the nature of the study to patients based on their acceptance to cooperate with the researcher in distributing questionnaires when the principal researcher was not in the lab.

For physicians, based on the list of physicians' names in Hebron governorate obtained from the Medicare's laboratories company quality management unit, the researcher asked some of the Medicare's staff working at Hebron branch to confirm the names of physicians in the list who are actually using the Medicare's website to get patients' test results. And then, the researcher visited the confirmed physicians in their clinics during their working hours and asked them if they are using Medicare's web application or not. If they are using the application, the researcher manually distributed the questionnaire to them and explained the research objectives before obtaining their agreement to answer the questionnaire. The challenge the researcher faced with some physicians was that the long time they took to return back the filled out questionnaire.

3.8. Data analysis

Data was entered and analyzed into SPSS version 20. Continuous variables were expressed as means and standard deviations as appropriate. Categorical variables frequencies and percentages were calculated. Pearson correlation coefficient analysis is used to check the association between (TAM) variables including (PEOU), (PU), (ATU), and (PIU). Also, the association between (TAM) variables and other identified external factors affect them which are (the availability of internet at home and workplace, self-efficacy using mobile and web applications, training by Medicare staff on how to use Medicare's mobile and web applications, the interior design of Medicare's mobile and web applications, trust the using of Medicare's mobile and web applications maintains the privacy of health information) is checked using Pearson correlation coefficient analysis. To check the differences and relationships between (TAM) variables and other factors (age, gender, description (patient, physicians)) and other identified demographic data, t-test and One-Way ANOVA test were used. With a significance level of 95%, the relationship is considered statistically significant when (P-Value <= 0.05). Similar categories were used to group the responses for the open-ended questions of the questionnaire and coded accordingly. Some of the results were produced by Likert scale analysis and the following distribution is used in measuring questionnaire's (TAM) variable paragraphs

Table 3.3: Likert scale

Very low	Low	Moderate	High	Very high
1	2	3	4	5

Table 3.4: Measurement scale

Mean	Degree
Less 2.5	Low
2.5-3.5	Moderate
More 3.5	High

3.9. Ethical consideration

The permission for distributing the questionnaires was primarily obtained from Medicare medical laboratories company administration (Appendix 5). The researcher added an information sheet explaining the purpose of the study with a confirmation that the participation was voluntary, and the participants' information was treated as confidential and was only used for scientific research purposes. The patients' and physicians' privacy and confidentiality were preserved, thus there was a confirmation that the participants did not need to provide information about their name, address, other information that leads to identifying their identity. The instructions to participate in this study were clarified in each questionnaire and the researcher explained the research objectives and the nature of the questionnaire to the participants before obtaining their responses to make them aware of the study and the questionnaire objectives.

3.10. Summary

This descriptive cross sectional study was conducted in Hebron governorate especially in Medicare medical laboratories branches using a questionnaire based on (TAM) theoretical framework which had been reliable and valid with overall reliability equals to 0.926. Permission was obtained from Medicare medical laboratories company and Arab American University (AAUP). Data were collected from patients and physicians who use Medicare's mobile and web applications face to face in 2020 and analyzed using SPSS. Statistical analysis and its results are presented in chapter four, and then a discussion of the results, conclusion, and recommendations will be in chapter five.

Chapter four: Results

4.1. Introduction

In this chapter, the results of this research were presented and analyzed according to the items of the questionnaire. Out of the distributed 120 paper-based questionnaires, 115 were returned back with a response rate of (95.83%). Of that, 113 valid responses (94.2%) were used for analysis.

4.2. Demographic and personal data

The main demographic and personal characteristics of patients and physicians who participated in the study are presented in Table (4.1, 4.2, and 4.3).

The gender of participants in this study was 61 males (54%) and 52 females (46%). Regarding the description of the participant, patients were 83 (73.5%) and physicians were 30 (26.5%) as presented in Table (4.1).
The age of participants ranges from 18 years to 60 years with an average of 31.2 years old. The average monthly income to the whole families of all participants is (6543.1 ₪), and ranges from the minimum income (2200 ₪) to the maximum income (15000 ₪) as presented in Table (4.2).
Participants were from different places of residence in Hebron governorate including ad-Dhahiriya (12), As-Samu (1), Ash-Shuyukh (4), Bani Na'im (1), Beit Kahil (1), Beit Ula (1), Beit Ummar (2), Dora (27), Halhul (2), Idhna (1), Nuba (1), Seir (6), Surif (2), Tarqumiyah (4), Yatta (6), in addition to 42 participants (37.2%) from Hebron city as presented in Table (4.1).

Regarding patient's education level, (1.2%) of participants have Elementary degree, (26.5%) of them have Secondary degree, (67.5%) of them have Bachelor degree and (4.8%) of them have other educational levels such as Diploma, Master and PhD.
The occupations of patients are varied including Bank Employee (4), Building Worker (9), Carpenter (1), Designer (1), Electrician (1), Electronic Marketing (1), Employee (1), Engineer (6), Football Player (1), Home Worker (12), Medical Lab Technician (9), Lawyer (5), Pharmacist (2), Physical Therapy Employee (1), Police Man (1), Radiologist (1), Secretary (1), Student (5), Teacher (8), Tourism Guide (1), and Trader (10).

For physicians, 2 of them (6.7%) are general physicians and 28 (93.3%) are specialists' physicians including (Dentist, Dermatology, Fertility, General Surgery, Internal, Kidney and Urology surgery, Medical Labs, Neurology, Obstetrics & Gynecology, Ophthalmology, and Orthopedics & Joints) as presented in Table (4.1).

Table 4.1: Demographic characteristics of participants - part (1)

Variable	Classification	Freq.	(%)
Gender	Male	61	(54.0)
	Female	52	(46.0)
	Total	**113**	**(100)**
Description	Patient	83	(73.5)
	Physician	30	(26.5)
	Total	**113**	**(100)**
Patient's Educational Level	Elementary	1	(1.2)
	Secondary	22	(26.5)
	University	56	(67.5)
	Other (Diploma, Master, PhD)	4	(4.8)
	Total	**83**	**(100)**
Place of Residence	Town in Hebron governorate	71	(62.8)
	Hebron City	42	(37.2)
	Total	**113**	**(100)**
Physician's Medical Ranking	General	2	(6.7)
	Specialist	28	(93.3)
	Total	**30**	**(100)**

Physicians' total years of experience ranges from 1 year to 34 years with an average of 14 years as presented in Table (4.2).

According to the number of times patients and physicians use the internet per day; it ranges from 2 to 24 times with an average of 11.2 times. Also, the previous period of using Medicare's mobile and web applications ranges from 0.5 to 48 months with an average value of 15.5 months among patients and physicians as presented in Table (4.2).

Table 4.2: Demographic characteristics of participants - part (2)

Variable	Mean ±SD	Maximum	Minimum
Age	31.2±9.1	60.00	18.00
Monthly Income	6543.1±2823.8	15000.00	2200.00
Physician's Total Years of Experience	14.0±9.8	34.00	1.00
Physician's Total Years of Experience in Current Place	7.3±6.7	30.00	1.00
Number of using the Internet per day	11.2±6.2	24.00	2.00
The length of using "Medicare" app in months	15.5±14.3	48.0	0.5

Usage of the internet and electronic applications

The following part of this section of the questionnaire's results contains elements related to other personal characteristics regarding the availability of resources including (internet at workplace/at clinic, internet at home, computer/laptop, smartphone, 3G service) and the majority of participants' responses as shown in Table (4.3) are (Yes) which implies that the resources are available.

In general, the majority of participants (87.6%) have the knowledge of using mobile and web applications while only (12.4%) have not. All participants (100%) reported that they do not have any reason to prevent them from using health mobile and web applications. However, half of them (50%) use other (e-Health) applications in addition to Medicare's app, and the number of those applications ranges from 1 to 5 applications. Regarding participants' trust in using health mobile and web applications, the majority of them (96.6%) trust these applications where (3.5%) of them don't have the trust of using health mobile and web applications as presented in Table (4.3).

Table 4.3: Usage of the internet and electronic applications - part (1)

Item	Yes		No		Total
	Number.	(%)	Number	(%)	
Is the Internet available at Work place/at clinic?	99	(87.6)	14	(12.4)	113
Is the Internet available at Home?	112	(99.1)	1	(0.9)	113
Do you have a Computer/Laptop?	88	(77.9)	25	(22.1)	113
Do you have a Smartphone?	113	(100)	0	(0.0)	113
Do you use 3G service?	95	(84.1)	18	(15.9)	113
Do you have the knowledge of using Smartphone or Web Apps?	99	(87.6)	14	(12.4)	113
In addition to "Medicare" App., do you use other e-health Apps?	56	(50.0)	56	(50.0)	112
Is there any reason that prevents you from using Smartphone or Web health Apps?	0	(0.0)	113	(100)	113
Do you trust the use of health information technology or e-health Apps?	109	(96.5)	4	(3.5)	113
Having Email Account	89	(78.8)	24	(21.2)	113
Having Facebook Account	100	(88.5)	13	(11.5)	113
Having Twitter Account	30	(26.5)	83	(73.5)	113
Having Instagram Account	63	(55.8)	50	(44.2)	113
Using Health Information App	58	(51.3)	55	(48.7)	113

According to the extent of using Medicare's mobile and web applications among patients and physicians, the percentages are distributed into daily use (8.8%), weekly use (17.7%), monthly use (28.3%), and other (45.1%) as presented in Table (4.4). To patients, the majority of responses are other (59%) which is related to (when performing a test) as patients explained in their responses. But to physicians, the majority of responses are weekly (56.7%), daily (33.3%), monthly (3.3%) which depending on patients visiting load, and other (6.7%) which is related to (when receiving a lab test result for a patient) as physicians explained in their responses.

According to the favorite way to receive lab test results, the responses are presented in Table (4.4), where the majority of participants (77%) prefer Medicare's App, (18.6%) of participants prefer paper test results, (4.4%) of participants prefer email, and (0%) prefer fax. Specifically, the favorite way for the majority of patients (77.1%) is Medicare's app, (19.3%) prefer receiving paper test results, and (3.6%) prefer receiving test results via email. To physicians, (76.7%) prefer receiving lab test results for their patients via Medicare's app, (16.7%) prefer receiving paper test results and (6.7%) prefer receiving test results via email. As presented, the way of receiving lab test results via Fax is not preferred by both groups of participants (patients & physicians).

Table 4.4: Usage of the internet and electronic applications - part (2)

Item	Classification	Freq.	(%)
To what extent do you use "Medicare" app.?	Daily	10	(8.8)
	Weekly	20	(17.7)
	Monthly	32	(28.3)
	when receiving lab test results	51	(45.1)
	Total	**113**	**(100)**
How would you like to receive the lab test result?	Email	5	(4.4)
	Fax	0	(0.0)
	Paper	21	(18.6)
	Medicare's App	87	(77.0)
	Total	**113**	**(100)**

4.3. TAM variables

Perceived ease of use (PEOU):

PEOU was measured using 11 items presented in Table (4.5), and the overall average of (PEOU) considered as high and equal 4.4 distributed into patients and physicians as (4.4, 4.6) respectively.

Table 4.5: Frequency, percentage, and average of PEOU items

Item	**Response:** Agree / Strongly Agree **Freq.** **(%)**	**Mean** ±SD
Learning to operate the app. has been easy for me	109 (96.5)	4.5±0.1
I have been trained enough to use the app. By Medicare lab staff	93 (82.3)	4.0±0.2
I have sufficient experience in using web and mobile applications	99 (87.6)	4.4±0.2
My interaction with the app. is clear & understandable	112 (99.1)	4.6±0.1
I find the app. is enjoyable to interact with	97 (85.8)	4.3±0.1
The interior design of the app. is clear and comfortable	112 (99.1)	4.4±0.1
It is easy for me to become skillful at using the app & navigating it	113 (100)	4.6±0.1
I find it easy to get the app. to do search	112 (99.1)	4.6±0.1
The app. works without errors	99 (87.6)	4.2±0.2
I find it easy to get the app. to show lab test result	113 (100)	4.7±0.1
I find the app. easy to use	113 (100)	4.7±0.1

Perceived usefulness (PU):

PU was measured using 14 items presented in Table (4.6), and the overall average of (PU) considered as high and equal 4.4 distributed into patients and physicians as (4.3, 4.6) respectively.

Table 4.6: Frequency, percentage, and average of PU items

Item	**Response:** Agree / Strongly Agree **Freq.** **(%)**	**Mean** ±SD
Using the app. enables me to get lab test result more quickly	113 (100)	4.7±0.1
Using the app. saves effort to get lab test result	113 (100)	4.7±0.1

Using the app. enables diagnosing of patient more quickly	104	(92.0)	4.5±0.1
Using the app. helps back up lab test results files	111	(98.2)	4.8±0.1
Using the app. facilitates communication with lab through information provided about branches & Telephone numbers	95	(84.1)	4.2±0.1
Using the app. increases the quality of lab service	103	(91.2)	4.3±0.1
The app. does not misuse patient's information	101	(89.3)	4.3±0.1
I find it easy to understand test result & medical definitions through the app.	50	(44.2)	3.2±0.3
Lab test result is true & accurate through the app.	108	(95.6)	4.5±0.1
I benefit from Medicare labs offers & campaigns through the app.	60	(53.1)	3.4±0.2
I have received test result on time through the app.	110	(97.3)	4.6±0.1
find the app. useful in my stressful work periods	112	(99.1)	4.7±0.1
Perceived ease of use of the app. increases perceived usefulness of the app.	113	(100)	4.7±0.1
I find the app. useful	113	(100)	4.7±0.1

Attitude toward using (ATU):

ATU was measured using 9 items presented in Table (4.7), and the overall average of (ATU) considered as high and equal 4.4 distributed into patients and physicians as (4.4, 4.5) respectively.

Table 4.7: Frequency, percentage, and average of ATU items

Item	**Response:** Agree / Strongly Agree **Freq.**	**(%)**	**Mean** ±SD
I feel comfortable while using the app	113	(100)	4.5±0.1
I enjoy discovering new features of the app	94	(83.2)	4.1±0.1
I prefer the electronic way of receiving lab test result	111	(98.2)	4.7±0.1

I prefer receiving paper lab test result manually beside receiving it through the app.	69	(61.1)	3.5±0.2
I use the app. whenever I need it	111	(98.2)	4.6±0.1
I trust the app. maintains the privacy of health information	108	(95.6)	4.4±0.1
I search the app. upon receiving the result	113	(100)	4.6±0.1
I am satisfied with the app	112	(99.1)	4.7±0.1
I realize that adding electronic apps to the health sector is useful	113	(100)	4.8±0.1

Behavioral intention to use (BIU):

BIU was measured using 2 items presented in Table (4.8), and the overall average of (BIU) considered as high and equal 4.6 distributed into patients and physicians as (4.6, 4.7) respectively.

Table 4.8: Frequency, percentage, and average of BIU items

Item	**Response:** Agree / Strongly Agree **Freq.**	**(%)**	**Mean** ±SD
I recommend others to use the app.	112	(99.1)	4.7±0.1
I intend to use the app. continuously	110	(97.3)	4.6±0.1

4.4. Hypotheses testing

In accordance with the study objectives and to examine the relationships among (TAM) variables and other external factors, the correlation analysis was conducted, followed by testing the significance of relationships. The hypotheses of this study were supported or rejected depending on the correlation results.

Hypotheses related to TAM variables:

H1: There is a positive relationship between (PEOU) and (PU) of Medicare's applications.

From the results of the correlation analysis presented in Table (4.9), hypothesis (H1) is **supported** because the impact of perceived ease of use of Medicare's applications among patients and physicians on their perceived usefulness is positive and significant (p-value = 0.000).

H2: There is a positive relationship between (PEOU) and (ATU) Medicare's applications.

The results of the correlation analysis presented in Table (4.9), indicate that hypothesis (H2) is **supported** because the impact of perceived ease of use of Medicare's applications among patients and physicians on their attitude toward using is positive and significant (p-value = 0.000).

H3: There is a positive relationship between (PU) and (ATU) Medicare's applications.

From the results of the correlation analysis presented in Table (4.9), hypothesis (H3) is **supported** because the impact of perceived usefulness of Medicare's applications among patients and physicians on their attitude toward using is positive and significant (p-value = 0.000). Also, the impact of perceived usefulness on attitude toward using is stronger than the impact of perceived ease of use.

H4: There is a positive relationship between (PU) and (BIU) Medicare's applications.

From the results of the correlation analysis presented in Table (4.9), hypothesis (H4) is **supported** because the impact of perceived usefulness of Medicare's applications among patients and physicians on their behavioral intent to use is positive and significant (p-value = 0.000).

H5: There is a positive relationship between (ATU) and (BIU) Medicare's applications.

From the results of the correlation analysis presented in Table (4.9), hypothesis (H5) is **supported** because the impact of attitude toward using Medicare's applications among patients and physicians on their behavioral intent to use is positive and significant (p-value = 0.000). Also, the impact of perceived usefulness on behavioral intent to use is stronger than the impact of attitude toward using.

Table 4.9: Pearson correlation analysis between TAM variables

Factor		PEOU	PU	ATU	BIU
PEOU	r-value	1	.703**	.532**	.529**
	p-value		.000	.000	.000
	N	113	113	113	113
PU	r-value	.703**	1	.622**	.742**
	p-value	.000		.000	.000
	N	113	113	113	113
ATU	r-value	.532**	.622**	1	.604**
	p-value	.000	.000		.000
	N	113	113	113	113
BIU	r-value	.529**	.742**	.604**	1
	p-value	.000	.000	.000	
	N	113	113	113	113

*p-value <0.05

Hypotheses related to TAM variables and external factors:

H6: There is a positive relationship between the availability of internet at home and workplace and (PEOU) of Medicare's applications.

H7: There is a positive relationship between the availability of internet at home and workplace and (PU) of Medicare's applications.

As presented in Table (4.10), the availability of internet at home and workplace which used to access Medicare's applications among patients and physicians impacts positively and significantly perceived ease of use and perceived usefulness. In general, hypotheses (H6, H7) are **supported**.

Also, the impact of the availability of internet at home and workplace on perceived usefulness is stronger than the impact on perceived ease of use.

H8: There is a positive relationship between user's self-efficacy in using mobile and web applications and (PEOU) of Medicare's applications.

H9: There is a positive relationship between user's self-efficacy in using mobile and web applications and (PU) of Medicare's mobile and web applications.

As presented in Table (4.10), user's self-efficacy in using mobile and web applications among patients and physicians impacts positively and significantly perceived ease of use and perceived usefulness of Medicare's applications. In general, hypotheses (H8, H9) are **supported**.

Also, the impact of user's self-efficacy in using mobile and web applications on perceived ease of use is stronger than the impact on perceived usefulness.

H10: There is a positive relationship between training by Medicare staff on how to use Medicare's applications and (PEOU) of Medicare's applications.

As presented in Table (4.10), training patients and physicians by Medicare staff on using Medicare's applications impacts positively and significantly perceived ease of use. In general, hypothesis (H10) is **supported**.

H11: There is a positive relationship between the interior design of Medicare's mobile and web applications and (PEOU) of Medicare's applications.

As presented in Table (4.10), the interior design of Medicare's applications impacts positively and significantly users' perceived ease of use. In general, the correlation is strong and hypothesis (H11) is **supported**.

H12: There is a positive relationship between the trust that Medicare's applications maintain the privacy of health information and (BIU) Medicare's applications.

As presented in Table (4.10), patients' and physicians' trust that using Medicare's applications maintains the privacy of health information impacts positively and significantly the behavioral intent to use. In general, hypothesis (H12) is **supported**.

Table 4.10: Pearson correlation analysis between TAM variables and external factors

Factor		**PEOU**
Availability of internet	r-value	.191*
	p-value	.043
	N	113

		PU
Availability of internet	r-value	.294**
	p-value	.002
	N	113
		PEOU
User's self-efficacy	r-value	.762**
	p-value	.000
	N	113
		PU
User's self-efficacy	r-value	.581**
	p-value	.000
	N	113
		PEOU
Training	r-value	.479**
	p-value	.000
	N	113
		PEOU
Interior design	r-value	.693**
	p-value	.000
	N	113
		BIU
Trust that the app maintains the privacy of health information	r-value	.358**
	p-value	.000
	N	113

*p-value <0.05

The above results of hypotheses testing are summarized as presented in Table (4.11).

Table 4.11: Summary of hypotheses testing

Hypothesis	Statement	Result
H1	There is a positive relationship between (PEOU) and (PU) of Medicare's applications.	Supported
H2	There is a positive relationship between (PEOU) and (ATU) Medicare's applications.	supported
H3	There is a positive relationship between (PU) and (ATU) Medicare's applications.	Supported
H4	There is a positive relationship between (PU) and (BIU) Medicare's applications.	Supported

H5	There is a positive relationship between (ATU) and (BIU) Medicare's applications.	Supported
H6	There is a positive relationship between the availability of internet at home and work place and (PEOU) of Medicare's applications.	Supported
H7	There is a positive relationship between the availability of internet at home and work place and (PU) of Medicare's applications.	Supported
H8	There is a positive relationship between user's self-efficacy in using mobile and web applications and (PEOU) of Medicare's applications.	Supported
H9	There is a positive relationship between user's self-efficacy in using mobile and web applications and (PU) of Medicare's applications.	Supported
H10	There is a positive relationship between training by Medicare staff on how to use Medicare's applications and (PEOU) of Medicare's applications.	Supported
H11	There is a positive relationship between the interior design of Medicare's applications and (PEOU) of Medicare's applications.	Supported
H12	There is a positive relationship between trust that Medicare's applications maintain the privacy of health information and (BIU) Medicare's applications.	Supported

4.5. Impact of demographic and personal characteristics on TAM variables

In order to identify other external factors that affect (TAM) variables and exploring the statistically significant differences, t-test, Pearson Correlation Coefficient, and One-Way ANOVA test were conducted.

Place of residence:

From the t-test analysis, there are statistically significant differences between participants depending on their place of residence. Participants who live in Hebron city have more level of (PU, BIU) with averages of (4.5, 4.7) than participants who live in a town in Hebron governorate with averages of (4.3, 4.5) respectively as presented in Table (4.12). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (PEOU, and ATU).

Description (patient, physician):

From the t-test analysis, there are statistically significant differences between participants depending on their description. Physicians have more level of usefulness (PU) with an average of 4.6 than patients with an average of 4.3 as presented in Table (4.12). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (PEOU, ATU, and BIU).

Patient's educational level:

From the t-test analysis, there are statistically significant differences between patients depending on their educational level. Patients with educational level (College or University) have more level of (PU, PEOU) with averages of (4.4, 4.5) than patients with educational level (School) with averages of (4.1, 4.2) respectively as presented in Table (4.12). However, there are no statistically significant differences between patients in terms of the remaining (TAM) variables (ATU, and BIU).

Computer or laptop ownership:

From the t-test analysis, there are statistically significant differences between participants depending on computer or laptop ownership. Participants who own a computer or a laptop have more level of (PEOU, PU, ATU, BIU) with averages of (4.6, 4.5, 4.5, 4.7) than participants who do not own a computer or a laptop with averages of (4.1, 4.0, 4.2, 4.3) respectively as presented in Table (4.12)

Use of 3G:

From the t-test analysis, there are statistically significant differences between participants depending on 3G usage. Participants who use 3G have more level of (PEOU, PU) with averages of (4.5, 4.4) than participants who do not use 3G with averages of (4.2, 4.2) respectively as presented in Table (4.12). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (ATU, and BIU).

Having general knowledge of using smartphone and web apps:

From the t-test analysis, there are statistically significant differences between participants depending on having general knowledge of using mobile and web applications. Participants who have the knowledge have more level of (PEOU, PU, BIU) with averages of (4.5, 4.4, 4.7) than participants who do not have the knowledge with averages of (3.9, 3.9, 4.3) respectively as presented in Table (4.12). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (ATU).

Using other E-Health apps:

From the t-test analysis, there are statistically significant differences between participants depending on using other E-Health applications in addition to Medicare's app. Participants who use other E-Health apps have more level of (PEOU, PU, ATU, BIU) with averages of (4.6, 4.6, 4.5, 4.8) than participants who do not use other E-Health apps with averages of (4.3, 4.2, 4.4, 4.5) respectively as presented in Table (4.12).

Table 4.12: Summary of t-test analysis between demographic and personal characteristics and TAM variables

Factor		PEOU	PU	ATU	BIU
Place of residence	p-value	.610	.020	.182	.023
Description	p-value	.084	.002	.147	.207
Educational level	p-value	.016	.002	.675	.323
Computer or laptop ownership	p-value	.000	.000	.004	.000
3G usage	p-value	.012	.034	.181	.111
Knowledge of using mobile or web apps	p-value	.000	.001	.199	.003
Using other E-Health apps	p-value	.002	.000	.046	.001

Test: t-test Analysis
*p-value <0.05

Time period of using Medicare's app:

As presented in Table (4.13), the length of the period of using Medicare's app (months) among patients and physicians impacts positively and significantly their usefulness and intent to use Medicare's application, but the impact on (PU) is stronger than that on (BIU). However, there is no impact on (PEOU, ATU).

Table 4.13: Pearson correlation analysis between the length of period of using Medicare's app and TAM variables

Factor		PEOU	PU	ATU	BIU
Time period of using Medicare's app	r-value	.168	.268**	.011	.193*
	p-value	.075	.004	.911	.040
	N	113	113	113	113

*p-value <0.05

The extent to which patients and physicians use Medicare's app:

From the One-Way ANOVA test, there are statistically significant differences between participants depending on how often they use Medicare's app (daily, weekly, monthly, and other). Participants who use Medicare's app daily have more level of (PEOU, PU, ATU) with averages of (4.7, 4.7, 4.7) than participants who use Medicare's app weekly with averages of (4.5, 4.5, 4.4), monthly with averages of (4.5, 4.4, 4.4), and other (when performing a lab test) with averages of (4.3, 4.2, 4.4) respectively as presented in Table (4.14). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (BIU).

The favorite way to receive lab test results:

From the One-Way ANOVA test, there are statistically significant differences between participants depending on their favorite way to receive lab test results (email, paper, and Medicare's app). Participants who prefer Medicare's app have more level of (PEOU, PU, BIU) with averages of (4.5, 4.5, 4.7) than participants who prefer receiving paper test results with averages of (4.1, 4.0, 4.2), and by email with averages of (4.45, 4.2, 4.2) respectively as presented in Table (4.14). However, there are no statistically significant differences between participants in terms of the remaining (TAM) variables (ATU).

Table 4.14: Summary of One-Way ANOVA test analysis between demographic and personal characteristics and TAM variables

Factor		PEOU	PU	ATU	BIU
Extent to which patients and physicians use Medicare's App	p-value	.016	.001	.041	.065
Favorite way to receive lab test results	p-value	.001	.000	.058	.000

Test: One-Way ANOVA

*p-value <0.05

The above p-value results of the impact of demographic and personal characteristics on (TAM) variables are summarized as presented in Table (4.15).

Table 4.15: Summary of p-value results of demographic and personal characteristics impact on TAM variables

Factor		PEOU	PU	ATU	BIU
Place of residence	p-value	.610	.020	.182	.023
Description	p-value	.084	.002	.147	.207
Educational level	p-value	.016	.002	.675	.323
Computer or laptop ownership	p-value	.000	.000	.004	.000
3G usage	p-value	.012	.034	.181	.111
Knowledge of using mobile or web apps	p-value	.000	.001	.199	.003
Using other E-Health apps	p-value	.002	.000	.046	.001
Time period of using Medicare's app	p-value	.075	.004	.911	.040
Extent to which patients and physicians use Medicare's app	p-value	.016	.001	.041	.065
Favorite way to receive lab test results	p-value	.001	.000	.058	.000

*p-value <0.05

4.6. The impact of using Medicare's mobile and web applications on the quality of service provided by Medicare medical labs

Another objective for this study is to measure the impact of using Medicare's applications on the perceived quality of service provided by Medicare's medical laboratories from several domains including timeliness, availability of information, and better communication. The results of the descriptive analysis are presented in Table (4.16). In accordance with the identified measurement scale in this study, the mean value of the quality measure is 4.5 (> 3.5), then the impact of using Medicare's applications on the quality of service provided by Medicare's company is **high**.

Table 4.16: Assessment of the impact of using Medicare's apps on the quality of service

Variable	Mean ±SD	Minimum	Maximum
Quality of service	4.5±0.1	3.3	5.0

4.7. Summary of the results

Out of the 120 distributed questionnaires, 113 valid responses were returned back. So, this study achieved a response rate of 94.2%.

54% of the participants are males and 46% are females with an average age of 31.2 years old. Patients represent 73.5% of all participants and physicians represent 26.5%. The average monthly income to all participants is 6543.1 ₪. There are 71 participants from different towns in Hebron governorate in addition to 42 participants from Hebron city. 1.2% of patients have Elementary educational level, 26.5% have Secondary educational level, 67.5% have Bachelor degree, and 4.8% have Diploma or Master or PhD. The occupations of them are varied. 6.7% of physicians are general practitioners and 93.3% are specialists. The average total years of physicians' experience are 14 years. Patients and physicians use the internet per day with an average of 11.2 times. Also, the average previous period of using Medicare's applications is 15.5 months. The majority of participants has internet at workplace and home, has a computer/laptop, smartphone, and 3G service. 87.6% of participants have general knowledge of using mobile and web applications. 50.0% of participants use other (E-Health) applications in addition to Medicare's app. 96.6% of participants generally trust health mobile and web applications. Patients who use Medicare's mobile application when performing a test represent the highest percentage 59% compared to daily, weekly, and monthly use. But to physicians, the majority of them 56.7% use Medicare's web application weekly.

11 items were used to measure (PEOU), 14 items to measure (PU), 9 items measure (ATU), and 2 items to measure (BIU) and the overall averages for all of them considered as high and equals 4.4, 4.4, 4.4, and 4.6 respectively. It was considered that there is an internal consistency between the items of (TAM) measures.

From the Pearson correlation Coefficient analysis of the hypotheses related to (TAM) variables; the results show that:

- The impact of (PEOU) among patients and physicians on their (PU) is positive and significant.
- The impact of (PEOU) on their (ATU) is positive and significant.

- The impact of (PU) on their (ATU) is positive and significant but the impact of (PU) is stronger than the impact of (PEOU).
- The impact of (PU) on their (BIU) is positive and significant.
- The impact of (ATU) on their (BIU) is positive and significant but the impact of (PU) is stronger than the impact of (ATU).

The hypotheses related to (TAM) variables and other external factors were tested using Pearson Correlation Coefficient analysis; it found that:

- The availability of internet at home and workplace among patients and physicians impacts positively and significantly (PEOU) and (PU) but the impact on (PU) is stronger than the impact on (PEOU).
- User's self-efficacy in using mobile and web applications among patients and physicians impacts positively and significantly (PEOU) and (PU) but the impact on (PEOU) is stronger than the impact on (PU).
- Training patients and physicians by Medicare staff on using Medicare's applications impacts positively and significantly (PEOU).
- The interior design of Medicare's applications impacts positively and significantly their (PEOU).
- Patients' and physicians' trust that using Medicare's applications maintains privacy of health information impacts positively and significantly their (BIU).

In order to identify other external factors that affect (TAM) variables, t-test, Pearson Correlation Coefficient, and One-Way ANOVA test were conducted. The results are summarized as follows:

- Participants who live in Hebron city have more level of (PU) and (BIU) with an average of 4.5, 4.7 respectively than participants who live in a town in Hebron governorate.
- Physicians have more level of (PU) with an average of 4.6 than patients with an average of 4.3.
- Patients with educational level (College or University) have more level of (PU) and (PEOU) with an average of 4.4, and 4.5 respectively than patients with educational level (School).

- Participants who own a computer or a laptop have more level of (PEOU), (PU), (ATU), and (BIU) with an average of 4.6, 4.5, 4.5, and 4.7 respectively than participants who do not.
- Participants who use 3G have more level of (PEOU), and (PU) with an average of 4.5, and 4.4 respectively than participants who do not.
- Participants who have a general knowledge of using mobile and web applications have more level of (PEOU), (PU), and (BIU) with an average of 4.5, 4.4, and 4.7 respectively than participants who do not.
- Participants who use other (E-Health) apps have more level of (PEOU), (PU), (ATU), and (BIU) with an average of 4.6, 4.6, 4.5, and 4.8 respectively than participants who do not.
- Time period of using Medicare's apps (months) impacts positively and significantly (PU) and (BIU), but the impact on (PU) is stronger than that on (BIU).
- Participants who use Medicare's app daily have more level of (PEOU), (PU), and (ATU) with an average of 4.7, 4.7, and 4.7 respectively than participants who use Medicare's app weekly, monthly, and other.
- Participants who prefer Medicare's app to receive lab test results have more level of (PEOU), (PU), and (BIU) with an average of 4.5, 4.5, and 4.7 respectively than participants who prefer receiving via paper, email, or fax.
- Finally, the impact of using Medicare's mobile and web applications on the quality of services provided by Medicare's medical laboratories company is high with an average of 4.5.

Chapter five:

Discussion, Conclusion, and Recommendations

5.1 Introduction

In this chapter, the results of the research will be discussed and then the conclusion and recommendations will be demonstrated. The discussion consists of the following parts including: TAM variables including (PEOU, PU, ATU, and BIU), demographic and personal characteristics and (TAM) variables, the impact of using Medicare's mobile and web applications on the quality of service provided by Medicare medical labs, and then notes and problems regarding the usage of Medicare's Apps.

5.2 Discussion

5.2.1 TAM variables

This study finds that patients' and physicians' acceptance is high toward using Medicare's mobile and web applications to receive lab test results electronically and affected by patients' and physicians' perceived ease of use and usefulness, attitudes, and intent to use Medicare's applications. The current study employs (TAM) as a theoretical model to allow patients and physicians to evaluate Medicare's mobile and web applications in terms of (TAM) main variables (PEOU, PU, ATU, and BIU) as when the user evaluates the application, this facilitates enhancement of the usability (PEOU) as (Chávez et al., 2019) found in evaluating a (mHealth) application. Also, when the user positively perceives the application, then the adoption of the application will be facilitated as well (B. Alanazi et al., 2020). Both groups (patients and physicians) perceived Medicare's applications as highly easy to use and useful. And then, according to other (TAM) variables, they show a high level of attitude and intent to use Medicare's applications. The most variable that affects the acceptability of patients and physicians to use Medicare's applications is the perceived usefulness (PU) due to its highly positive and significant impact on other (TAM) variables such as (ATU, and BIU) and then on the overall acceptance. All of the relationships between (TAM) main constructs are positive and statistically significant which is then consistent with the original (TAM) findings (Davis, 1989) as expected and proposed in hypotheses depending on (TAM) concepts. Also, the relationships regarding other proposed

factors and (TAM) variables are validated and all of them are positive and statistically significant. These relationships and findings can be discussed as follows:

1. PEOU of Medicare's mobile and web apps

The results indicate that patients and physicians who use Medicare's applications perceived them as highly easy to use.

Perceived ease of use of Medicare's mobile and web applications is considered as a factor that affects the acceptance and other elements of (TAM) core constructs (Holden & Karsh, 2010; Davis, 1993; Hsiao, Wu, & Chen, 2013). It is noted that patients' and physicians' (PU) is positively, and significantly related to their (PEOU) based on (TAM) theories (Holden & Karsh, 2010) where this study suggests that if patients and physicians feel that Medicare's applications are easy to use, then they are more likely to perceive them as useful. In this study, the level of (PEOU) is high, and then the level of (PU) is also high among patients and physicians.

Also, (PEOU) is considered as a factor that affects positively and significantly the attitude of patients and physicians to use Medicare's applications where the results of statistical analysis indicate that patients and physicians have a high level of attitude to use Medicare's applications due to their high perceptions of ease of use of Medicare's applications and the results are consistent with the bases of the original (TAM) theories (Holden & Karsh, 2010).

However, as (PEOU) affects other factors related to (TAM) main concepts and control the level of their perceptions, it is also affected by other factors related to personal and organizational characteristics like the availability of internet at home and workplace, user's self-efficacy in using mobile and web applications, training on using Medicare's applications, and the usability of the interior design of Medicare's mobile and web applications (Hsiao et al., 2011; Zayyad & Toycan, 2018).

The availability of internet at home and workplace to access Medicare's applications among patients and physicians in Hebron governorate is found to be a weak factor that somewhat significantly impacts the level of ease of use of Medicare's applications as currently the internet becomes available everywhere, so it is not considered as main factor anymore which could affect the usability of Medicare's applications. However, Medicare's applications need the internet to access their services.

User's-self efficacy in using mobile and web applications (general knowledge) is recognized as an important factor that is significantly required to the ease of use of Medicare's applications perceived by patients and physicians. In this study, patients and physicians report a high level of self-efficacy in using mobile and web applications and thus the results lead to a high level of perceived ease of use among them. These results are similar to those found by (Ologeanu-Taddei et al., 2015), but they are opposite of what (Jeon & Park, 2015) found as self-efficacy does not significantly affect the user's (PEOU) of the mobile application to manage obesity.

Medicare's staff tends to train new users (patients and physicians) on how to install and use Medicare's mobile and web applications to receive lab test results electronically. The results found by (Asua, Orruño, Reviriego, & Gagnon, 2012) demonstrated that organizational facilitators such as the technical support and training enhance the intent of users to use the new system. In this study, (PEOU) affects (PU) which in turn affects (BIU) and due to the high level of (PEOU), this leads to a high level of (BIU) as it strongly affected by (PU). Then, training is considered as a factor that plays a role in positively and significantly solving the problems may users encounter and then increasing the level of (PEOU) of Medicare's applications among patients and physicians. These findings are similar to what (Jeon & Park, 2015) found.

The ease of technical structure and the interior design as mentioned before (Asua, Orruño, Reviriego, & Gagnon, 2012) is considered as a factor that predicts (BIU), and our study confirms the impact on (BIU) which influenced by (PU), and (PU) is influenced by (PEOU). The ease of interior design of Medicare's applications influences positively and significantly the ease of moving through the app and then the level of (PEOU) of Medicare's applications. Patients and physicians could not be able to experience and understand the functions of Medicare's applications without the usability of user's interfaces. It is known that if the operating process of any application is unfriendly, then users may even refuse to use it (BIU) and seek alternative products or services (Liu et al., 2013).

2. PU of Medicare's mobile and web apps

The results indicate that patients and physicians who use Medicare's mobile and web applications perceived them as highly useful.

Perceived usefulness of Medicare's applications is identified as high as it is affected by the high level of usability (PEOU) and is considered as a factor that strongly correlated with patients' and physicians' acceptance (Portz et al., 2019) which is mainly governed by (PU) as it is positively, and significantly affect (ATU) based on the original (TAM) theories (Holden & Karsh, 2010). Our study suggests that the impact of (PEOU) on (ATU) is less than the impact of (PU) on (ATU). Therefore, due to the high level of usefulness regardless of the high level of (PEOU), the level of patients and physicians attitude toward using is also high.

Similarly, as (PU) increases the level of (ATU) positively and significantly, this subsequently increases the level of (BIU) due to the significant impact of (PU) and (ATU) on behavioral intent to use. Thus, this study indicates that the high level of usefulness perceived by patients and physicians leads to the high level of attitude and their intent to use Medicare's applications as noted from results and these findings are similar to the findings of previous studies regarding (mHealth) and (PHR) as enhancing (PU) will increase the level of users' (BIU) (Liu et al., 2013; Hoque, 2016; Alloghani et al., 2016; Jeon & Park, 2015).

PU is also affected by other external factors like the availability of internet at home and workplace, and user's self-efficacy (Hsiao et al., 2011). The availability of internet at home and workplace to get access to Medicare's applications in Hebron governorate shows a stronger relationship with (PU) than the relationship with (PEOU) as there are no services of Medicare's applications without access to the internet.

As mentioned before, user's-self efficacy in using mobile and web applications is an important factor that affects (PEOU) of Medicare's applications among patients and physicians, and (PEOU) has an important impact on (PU). Then, as patients and physicians imply a high level of self-efficacy in using mobile and web applications, this means that there is a high level of (PU) accordingly and the results is similar to those found by (Ologeanu-Taddei et al., 2015).

3. ATU & BIU Medicare's mobile and web apps

The results indicate that patients and physicians who use Medicare's mobile and web applications perceive them with a high level of attitude and intent to use.

The attitude of patients and physicians toward using Medicare's applications is recognized as high as it is affected by the high level of usefulness (Holden & Karsh, 2010). This study finds that the impact of (ATU) on (BIU) is positive and significant and this is similar to the results found by (Zayyad & Toycan, 2018), but it is less than the impact of (PU) on (BIU). So, due to the high level of usefulness regardless of the high level of (ATU), the level of patients' and physicians' intent to use is also high similar to the findings of (Liu et al., 2013).

Thus, this study suggests that, as patients and physicians perceive Medicare's applications as highly useful, and due to the significant, strong, and positive impact of usefulness on the intent of patients and physicians toward using Medicare's applications; this increases the level of patients and physicians intent to use them. Therefore, when patients and physicians feel that Medicare's applications are useful and have benefits, they subsequently intend to use them. The results of this study are similar to those which considered that patients are most concerned about whether the benefits and services provided by the applications are useful or not and then other concerns regarding problems or technical structure are not major issues (Liu et al., 2013). In this study, patients and physicians hope to receive their medical test results electronically from the lab without the need to visit it and receive the results manually which then preserves their time and efforts. Accordingly, the ease of use is not a critical concern - compared to the usefulness - for the intent of patients and physicians to use the application and this is the direct opposite of the results demonstrated by (Hoque, 2016; Alloghani et al., 2016) that (TAM) main concepts (PU, PEOU) significantly and positively affect the intent to use and adopt (mHealth) services and also the direct opposite of the results found by (Jaradat et al., 2013) as (PEOU) affect the intent of user to use (mHealth) information systems the most.

Also, based on the original (TAM) model, this study concludes that (BIU) can be a strong predictor of the actual use of Medicare's mobile and web applications.
BIU is also affected by another external factor positively and significantly which is the trust that using Medicare's applications among patients and physicians maintains the privacy of health information as (B. Alanazi et al., 2020) found that the negative perceptions of the users influenced by risks, trust, privacy and security concerns, and high costs of implementation. In this study, patients and physicians show a high level of trust in using Medicare's applications. Thus, this study suggests that when patients and physicians trust using Medicare's applications as they

maintain health information privacy, then they get a high level of intent to use them and this is similar to the results found by (Alloghani et al., 2016). However, this can be generalized to other electronic health applications in different fields as Medicare's mobile or web application is just an example.

5.2.2 Demographic and personal characteristics and TAM variables

The second main research question in this study is "What are the factors that could affect the acceptance of patients and physicians to use health informatics technology?" the results based on the identified demographic and personal characteristics in the current research questionnaire demonstrate the factors that have whether no impact or weak or strong impact on the level of acceptance measured by (TAM) main constructs. Some of the relationships between (TAM) main constructs and the studied demographic and personal characteristics are positive and statistically significant, thus these results can be generalized to the whole population in Hebron governorate. Conversely, some of the relationships regarding other proposed demographic and personal characteristics and (TAM) variables are validated and they are not supported. These characteristics and relationships can be demonstrated as follows:

1. **Demographic and personal characteristics that do not affect patients' and physicians' level of acceptance**

Some of the demographic and personal characteristics that are proposed and studied in this research questionnaire do not have an effect on the level of acceptance among patients and physicians. These characteristics include gender, age, and income. Gender of patients and physicians do not affect significantly any of (TAM) variables (PEOU, PU, ATU, and BIU) and then the level of acceptance between males and females is almost the same which is similar to the findings of (M. Alanazi & Soh, 2019) where there was no correlation between the gender and user's acceptance to use (IoT) and the opposite of the results found by (Hoque, 2016) while gender is considered as an external factor that affects the acceptance of (mHealth). Also, the age and monthly income of participants do not correlate significantly with any of (TAM) measures, therefore they do not influence the extent to which patients and physicians accept receiving lab test results via Medicare's applications, these results are opposite of what found by (B. Alanazi et al., 2020) as the age of users affect their perceptions and acceptance. However, gender, age, and

income do not fit the objective of this study which aims to identify the external factors that affect the usage of Medicare's mobile application among patients and Medicare's web application among physicians and assess the impact of them on (TAM) variables (PEOU, PU, ATU, BIU).

Despite the variety of occupations of participated patients, it also does not affect significantly the extent of acceptance among patients.

To physicians who participated in this study, despite some of them have general medical rank and the others have specialist medical rank, the medical rank as a demographic or personal characteristic does not affect significantly the level of acceptance among them. In addition, the total years of experience among them are ranging from low to high, but the total years of experience as a factor does not affect the level of acceptance among physicians to use Medicare's web application. Thus, the occupation of patients, the medical rank of physicians, and the total years of experience as proposed factors in this study do not affect the extent of patients' and physicians' acceptability to use Medicare's applications and then to use other (E-Health) applications.

The smartphone is required to use Medicare's mobile application among patients, and the results indicate that all participants have a smartphone. Therefore, there is no statistically significant difference and correlation between participants in terms of having a smartphone and (TAM) variables, which then indicates that the ownership of a smartphone is not considered as a factor that affects the extent of acceptability to use Medicare's applications among patients and physicians in Hebron governorate.

Another external factor proposed in this study is the number of times patients and physicians use the internet per day. But, the results demonstrate that this factor does not affect the acceptance of patients and physicians to use Medicare's mobile and web applications as there is no correlation between this factor and (TAM) main constructs. Therefore, smartphone ownership and the number of times patients and physicians use the internet per day do not fit the objective of this study which aims to identify the external factors that affect (TAM) variables and then the overall level of acceptance.

Also, having social media accounts such as Facebook, Twitter, and Instagram in addition to having an email account is proposed as a factor that could affect the extent of acceptance toward

using Medicare's applications among patients and physicians due to their proposed role in increasing the level of knowledge and experience of users in using mobile and web applications. The results indicate that this factor does not influence the level of acceptance as the relationships between it and (TAM) variables are not supported where there is no significant impact on (PEOU, PU, ATU, and BIU).

2. Demographic and personal characteristics that affect patients' and physicians' level of acceptance

One of these characteristics of participants is the place of residence whether they live in Hebron city or a town in Hebron governorate. For participants who live in Hebron city, the results indicate that they have a higher level of acceptance to use Medicare's applications than those who live in a town in Hebron governorate as they have a higher level in terms of (PU) and (BIU). The difference between participants is significant and can be generalized to the whole population in Hebron governorate. This may refer to the people's culture which is different between city and town in Hebron governorate. Also, most of the physicians are located and work in Hebron city, so this also plays a role in increasing the level of usefulness and intent to use. There is no difference between participants depending on the place of residence in terms of usability and attitude toward using, and then the level of (PEOU) and (ATU) is almost the same.

Another personal characteristic is the participant's description in terms of patient or physician. The results demonstrate that physicians have more level of usefulness than patients which may refer to the nature of their jobs which depends on the need for quick lab test results to provide the appropriate diagnosis and treatments for their patients without waiting for patients to get paper lab tests results manually. Therefore, the level of acceptance among physicians is higher than that among patients, and on the other hand, there is no difference between them in terms of (PEOU, ATU, and BIU).

To patients, the results indicate that patients who have college educational level (Bachelors, Master, or PhD) have more level of usefulness and ease of use than patients with school educational level (Elementary, Preparatory, or Secondary) and then the level of acceptance among patients with college educational level is higher than those with school educational level. This may be explained as patients with college educational level may have better skills and

higher knowledge in using technology and its applications in different fields of life. They may have jobs and thus there is no need to visit the lab to get test results manually during working hours which preserves effort and then increases the level of usefulness. Furthermore, the nature of their jobs may need using technology and its applications which then increase the level of ease of use of Medicare's applications which then can be reflected to other applications. Also, when patients and physicians have the general knowledge of using mobile and web applications as a factor that affects patients' and physicians' acceptance, this leads to increased levels of ease of use, usefulness, and then the intent to use Medicare's applications and other health applications due to the increased desire of the user to utilize the applications regardless the usability requirements.

As the availability of the internet at home and workplace plays a role in increasing the level of ease of use and usefulness, there are also other resources that can play a role in increasing the level of acceptance to use Medicare's applications and can be reflected to other health applications such as computer or laptop, and 3G service. Ownership of a computer or a laptop is necessary especially to physicians due to the nature of their Medicare's application which is based on a web service and it is demonstrated as it has an impact on all (TAM) main variables and then it has an impact on the overall level of acceptance among participants where without a computer or a laptop, physicians cannot access Medicare's application services. Also, there are statistically significant differences between participants depending on 3G usage. Participants who use the 3G service have more levels of (PEOU and PU) than those who do not use the 3G service, but there is no impact on the level of (ATU and BIU). In general, the internet is available at home and workplace to all participants in Hebron governorate, and then the impact of it on the level of acceptance is weaker than the impact of 3G service due to the importance of 3G service in enabling internet access everywhere patient or physician exists. Thus, the use of 3G services has a significant impact on increasing the level of usefulness and usability and then the level of acceptance more than the internet at home and workplace. However, there are no differences based on internet availability at home and workplace, and availability of 3G service on (ATU and BIU).

As a factor that has an impact on patients' and physicians' acceptance to use Medicare's applications, the results indicate that patients and physicians who use other electronic health

applications in addition to Medicare's application have more level of all (TAM) variables including (PEOU, PU, ATU, and BIU) than who do not use due to their previous experience and benefits they recognized into them. Thus, when users realize the role of health applications in their health management, this may encourage them to use and apply other health applications which in turn increase the level of their acceptance. However, there is a significant impact of using other (E-Health) applications on patients' and physicians' acceptance to use Medicare's applications.

In addition, the results demonstrate that patients and physicians who use Medicare's mobile and web application for a long time period show a high level of usefulness and intent to use the application, this may be explained as the users who use Medicare's application for a long time, then they might use the application more than one time which in turn reflects that the users benefit from the application very well and this will increase the level of usefulness and encourage the users to intend to use it continuously. Also, the results indicate that the users especially physicians who use Medicare's applications daily have more level of ease of use, usefulness, and attitude toward using than those who use Medicare's applications weekly, monthly, or even when they need it, particularly when their patients perform a medical lab test. It is concluded that when the usage of Medicare's applications among patients and physicians is much and near to daily use, then the problems of ease of use will be solved and then increases the level of usefulness which in turn increases the level of attitude accordingly as resulted before.

In accordance with the favorite way to receive lab test results, the majority prefer Medicare's application, paper, and email, but not through the fax. Patients and physicians after applying and experiencing different ways to receive lab test results can able to choose their favorite way to receive lab test results. Most patients and physicians prefer Medicare's application to receive lab test results and this plays a role in increasing the level of acceptance among them as the level of ease of use, usefulness, and intent to use Medicare's applications are higher than those who prefer paper and email. This suggests that when the user personally feels comfortable with a particular way and prefers it, this means that he/she intends to use it and then this means that there is an increased level of usability and usefulness (Liu et al., 2013).

5.2.3 The impact of using Medicare's mobile and web applications on the quality of service provided by Medicare medical labs

The last objective of this study is to measure the impact of using Medicare's applications on the quality of service provided by Medicare labs. The quality of service is measured by several domains due to (IOM) such as timeliness which is related to receiving health service with delay's minimization. Also, access and availability of relevant health information at any point of care as a feature provided by (EHR) found in Canada (Tharmalingam, Hagens, & Zelmer, 2016) improves the quality of healthcare service, and better communication among patients and healthcare providers was recognized to enhance the level of service's quality (Portz et al., 2019), and quality in healthcare can be defined as "*the degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge*" ('WHO | Delivering quality health services', 2019)

In this study, the 14 items used to measure usefulness include 6 items used to assess the quality of service regarding Medicare medical laboratories mobile and web applications services as the increased level of quality leads to an increased level of usefulness and the positive perceptions of users depends on systems benefits including increased quality, enhanced communication, and information availability as (B. Alanazi et al., 2020) found. These items are:

- using the application enables me to get the lab test result more quickly,
- using the application saves effort to get the lab test result,
- using the application enables diagnosing of the patient more quickly,
- using the application helps back up the lab test results files,
- using the application facilitates communication with the lab through information provided about branches and telephone numbers,
- and the last item is using the application increases the quality of lab service and this item is to confirm their responses to the previous 5 items.

The results indicate that the usage of Medicare's applications saves time and effort to patients and physicians and enables physicians to diagnose patients based on lab test results quickly with minimization of delay in term of time. Using the application saves effort to visit the lab to get lab test results manually, this item may imply another domain of quality in healthcare which is

related to safety (Bello Garcés, 2018) while the usage of Medicare's mobile and web application during COVID-19 emergency situation reduces physical communication between human and this is an important factor to somewhat minimize the infection among people. Using the application helps back up lab test results files which serve the availability of information everywhere, and also using the application facilitates communication with lab staff which serves another domain to measure quality. Therefore, this study suggests that the usage of Medicare's mobile and web applications among patients and physicians confirms or improves the quality of service provided by Medicare's medical laboratories branches in Hebron governorate especially with the emergency situation due to COVID-19.

5.2.4 Notes and problems regarding the usage of Medicare's apps

The current research questionnaire's last part asks participants to add any comment or problem they might have. In general, patients and physicians do not report very negative notes or tough problems regarding their usage and design of Medicare's applications to receive lab test results electronically.

To patients, some of them leave notes and suggestions to optimize the role of the app including: It is a good idea to add explanations regarding the nature of some tests and if there are special instructions to conduct them such as the need for fasting before coming to the lab and how many hours are required for fasting. Also, they appreciate the application like it is very useful, especially during COVID-19 emergency situation as it reduces human physical communication in the lab.

However, patients struggle with the application like it only works when the internet is available, and mobile is not always connected to the internet, the majority of them do not understand the meaning of test results due to not all of them are specialized in a medical field, and also they face a rare problem regarding the interior tasks of the application like physicians list sometimes disappears, especially for iPhone users.

To physicians, some of them also confirm the problems some patients faced like the need for internet access and the data download speed is slow sometimes, and notes regarding the need to add instructions and procedures to some tests like fasting and number of hours of fasting. Some of their notes are positive and encouraging the usage and development like these applications in

the Palestinian environment and supporting expansion in other healthcare fields as these applications become required tools to keep up with technology development. On the other hand, some of the physicians' notes are like suggestions regarding the technical structure of the application's services like when the physician needs to search a patient's name, he/she needs to insert the full name of the patient in one field which then leads to show a long list of patients' names, and then this makes searching as an exhausting process for the physician. Thus, they suggest enabling physicians to insert the patient's name using four fields for the first, second, third, and fourth parts of the patient's name. However, some physicians consider that the application is comfortable, provides timely delivery of results, does not delay the patient, speeds up treatment, and saves time and effort.

5.3 Conclusion

In conclusion, Medicare's technological applications were implemented as tools to send lab test results to patients and physicians electronically. This research modified the original (TAM) model to explore the extent of patients' and physicians' acceptability to use Medicare's technological applications and the factors that influence it in Hebron governorate. Thus, this research validated the relationships between (TAM) core constructs including (PEOU, PU, ATU, and BIU) and the overall impact on acceptability. Also, this research incorporated external factors suggested by (TAM) and investigated their impact on (TAM) variables and then on the level of acceptance to use health information technology. A total of 113 patients and physicians participated in this study, 54% of them were males and 46% were females with an average age of 31.2 years old. Patients represented 73.5% of all participants and physicians represented 26.5%.

The results showed no surprising findings as they confirmed proposed hypotheses and previous findings based on (TAM) as the relationships between all of them were strong, positive, and statistically significant including 1) the impact of ease of use of Medicare's applications perceived by patients and physicians (PEOU) on their perceived usefulness (PU); which explained that Medicare's applications were easy to use and this increased the level of their usefulness and benefits, 2) the impact of ease of use (PEOU) and usefulness (PU) on patients' and physicians' attitude toward using Medicare's applications (ATU); which explained that Medicare's applications were easy to use and useful, this increased the level of users' attitude, 3)

the impact of perceived usefulness (PU) and attitude toward using Medicare's applications (ATU) on patients' and physicians' intent to use Medicare's applications (BIU), which explained that Medicare's applications were useful and users had high attitude to use them, this increased the level of users' intent to use them. In general, the levels of all (TAM) main construct were high which explained that the level of acceptance to use Medicare's mobile and web applications among patients and physicians was also high.

According to proposed external factors in this research that could be considered as challenges or determinants to users' acceptance, the results also showed that all of those factors had a positive and significant impact on (TAM) main constructs and then on the overall acceptance to use health information technology in Hebron governorate as follows: the availability of internet affected (PU), user's self-efficacy affected (PEOU), training affected (PEOU), the usability of the interior design of Medicare's applications affected (PEOU), and users' trust that using Medicare's applications maintains the privacy of health information affected (BIU).

In addition, some of the studied demographic and personal characteristics in this research that had a positive impact on (TAM) variables and then on the overall level of acceptance include the place of residence, description of participant (patient, or physician) where physicians got benefits (PU) more than patients, educational level, owning a computer or a laptop, 3G usage, having general knowledge of using smart apps, using (E-Health) apps, time period of using Medicare's app, the extent of using Medicare's app, and user's favorite way to receive lab test results.

Another finding this research has confirmed that using Medicare's mobile and web applications had a highly positive impact on the quality of services provided by Medicare's medical laboratories company and then increased level of benefits (PU) which led to an increased level of acceptance.

Further, the results of this research confirmed that they could be successfully generalized to the whole population in the Palestinian context and also confirmed the applicability of adopting other smart health information technology applications in Palestine.

5.4 Practical implications

In general, our study is expected to have positive and important implications on Medicare's medical laboratories company, especially for its decision makers as they will encourage the development like these applications supporting other sides of their services as a result to the high level of acceptance to use these applications by patients and healthcare professionals. Positive and important implications are also expected for other medical laboratories companies in Palestine to utilize information technology applications to provide their services to patients and healthcare professionals.

Also, our study may have positive implications on decision makers in Palestinian healthcare institutions to expand their utilization of health informatics systems and to focus more on information technology applications, where the most important one of them is the electronic health record (EHR) which becomes a critical need in the health sector as a result to the increasing need to restructure the ways of healthcare delivery.

In addition, this study may have positive implications on encouraging the cooperation between Palestinian healthcare institutions and the local information technology companies to develop health informatics applications serving the requirements of patients and healthcare professionals.

5.5 The strengths and limitations of the study

Strengths of the study:

1. This is the first research targeting this subject in Hebron governorate up to the researcher's knowledge.
2. The results can be generalized to the whole population in Hebron and other Palestinian governorates.
3. The framework applied (TAM) can be used to predict the acceptability to use other health information applications in different healthcare fields prior to their actual implementation in Palestine.
4. Most significantly, this research could benefit Medicare's medical laboratories company management in their future plans to extend their adoption of (E-Health) technologies taking into account notes and problems left by users.

5. This research may encourage decision makers in Palestinian health institutions to recommend health care delivery to utilize technology and information technology.

Limitations of the study:

1. Due to privacy concerns, Medicare's laboratories company administration refused to provide the researcher with a list of patients' contact information to contact them to obtain their responses.
2. The daily number of incoming patients to the lab in 4 branches - who use the "Medicare" smartphone application-, was very small which then decreased the sample size.
3. Emergency situation due to Covid-19 minimizes the number of incoming patients who use Medicare's application to get their test results.
4. Lack of cooperation of some physicians in filling out research questionnaire.
5. Data collection from patients and physicians as 2 different groups could be influenced by the user's experience and level of usage which may not facilitate a comprehensive understanding of the relationships between variables.

5.6 Recommendations

1. Palestinian health institutions should be encouraged to adopt modern (IT) applications and solutions.
2. Financial solutions should be provided to facilitate the expansion of health informatics applications adoption in Palestine.
3. The role of (E-Health) applications in providing health care services should be highlighted by health institutions in different fields.
4. Information technology companies should focus on developing (E-Health) applications that suit Palestinian context requirements taking into consideration the external factors that affect users' acceptance.
5. Medicare medical laboratories should make access to test results and other health information provided by its mobile application available to patients without internet access.
6. Medicare medical laboratories should enhance the search technique physicians use to search patients' test results using their names by dividing the full name search field into 4

name search fields to minimize the resulted list of tests and then speed up access to the target patient's test result.

7. Further instructions and tests explanations should be added to Medicare's mobile and web applications that guide patients to do the test.
8. The high acceptance of new electronic applications by both, patients and physicians, should encourage the healthcare policy makers to establish the patient health record at the Palestinian national level.

5.7 Areas of future research

1. Further studies exploring the acceptance of patients to use other electronic applications in healthcare fields such as mother and child health-related applications.
2. Further studies by other Palestinian medical laboratories companies to predict their patients' acceptance to use new technological applications in their health services delivery.
3. Other factors affecting patients' and healthcare providers' acceptance to use Medicare's technological applications.
4. Further studies exploring the extent to which healthcare providers accept to use (E-Health) applications in their work.
5. Further studies focus on acceptance for (ICT) adoption in different healthcare fields.

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Appendices

Appendix (1): Arabic Survey Questionnaire

كلية الدراسات العليا / المعلوماتية الصحية

استبانة بحث علمي

تحية طيبة وبعد،،،

تقوم الباحثة بإعداد دراسة حول "تقييم مدى تقبل الأطباء الذين يستخدمون تطبيق الويب وكذلك المرضى الذين يستخدمون تطبيق الهاتف المحمول والخاصة بمختبرات ميديكير، كتوجه جديد وكبديل تكنولوجي للوسيلة التقليدية في الحصول على نتائج الفحوصات بشكل يدوي من المختبر".

وقد تم اختياركم كجزء من عينة الدراسة، لذا نضع بين يديكم هذه الاستبانة كجزء من الدراسة للحصول على درجة الماجستير في المعلوماتية الصحية من الجامعة العربية الأمريكية، راجين تقديم المساعدة وذلك بالإجابة عن فقرات الاستبانة بدقة وموضوعية لما له من أثر كبير في الحصول على نتائج دقيقة. علما أن كافة المعلومات ستحاط بالسرية التامة ولا يمكن الاطلاع عليها وهي لغرض البحث العلمي فقط. المشاركة بالدراسة طوعية اختيارية، وعليه لا داعي لكتابة الاسم او أية معلومات تدل على شخصكم الكريم.

كما أن الباحثة على استعداد لتزويدكم بنتائج الدراسة حين الانتهاء منها في حال الطلب، مع الشكر الجزيل لتعاونكم.

للاستفسار يمكنكم الاتصال على:

بشرى شلالده – جوال رقم: 0597293905

او عبر البريد الالكتروني: Boshra.sh.1996@gmail.com

الباحثة: بشرى شلالده
اشراف الدكتور: حسين الجبارين
شاكرون لكم حسن تعاونكم

(أ) القسم الأول: البيانات الشخصية:

أرجو الإجابة على البيانات الشخصية باستعمال الأرقام الصحيحة عند وجود إجابة رقمية أما الأسئلة الأخرى فضع علامة (x) على الإجابة المناسبة:

1. **الجنس:** □ ذكر □ أنثى
2. **العمر بالسنوات:.....**
3. **مكان السكن (المدينة / المنطقة):.....**
4. **الدخل الشهري لجميع افراد الاسرة الذين يعيشون معك في نفس المنزل: ..... شيكل**
5. **الوصف:** □ مريض □ طبيب

5.1 اذا كان الوصف "مريض"،

5.1.1 ما هو مستواك التعليمي؟ □ ابتدائي □ اعدادي □ ثانوي

□ جامعي / التخصص؟..... □ غير ذلك / حدد:.....

5.1.2 ما هي مهنتك؟ .....

5.2 اذا كان الوصف "طبيب"،

5.2.1 ما هو تصنيفك المهني: □ طبيب عام □ طبيب اخصائي / التخصص: .....

5.2.2 سنوات الخبرة بشكل عام: .....

5.2.3 سنوات الخبرة في مكان العمل الحالي: .....

6. **هل خدمة الانترنت متوفرة في مكان العمل/ داخل العيادة؟** □ نعم □ لا
7. **هل خدمة الانترنت متوفرة في المنزل؟** □ نعم □ لا
8. **هل تمتلك جهاز كمبيوتر / لابتوب؟** □ نعم □ لا
9. **هل تمتلك هاتفا ذكيا؟** □ نعم □ لا
10. **هل تستخدم شبكة الانترنت 3G؟** □ نعم □ لا
11. **هل لديك معرفة في استخدامات تطبيقات الهاتف المحمول او الويب؟** □ نعم □ لا

12. تقريبا، كم مرة تقوم باستخدام شبكة الانترنت خلال اليوم الواحد؟ .....

13. اضافة الى تطبيق "ميديكير"، هل تستخدم تطبيقات الكترونية أخرى متعلقة بالصحة؟ □ نعم □ لا

13.1 اذا كان الجواب نعم، كم عدد التطبيقات الصحية التي قمت باستخدامها؟ .....

14. هل يوجد ما يمنعك من استخدام تطبيقات الهواتف المحمولة او الويب المتعلقة بالصحة ؟ □ نعم □ لا

14.1 اذا كان الجواب نعم، أذكر السبب:

.....

.....

15. هل لديك ثقة في استخدام تكنولوجيا المعلومات الصحية او تطبيقات الانترنت الصحية؟ □ نعم □ لا

16. منذ متى تستخدم تطبيق "ميديكير" الذكي؟ .....

17. ما مدى استخدامك لتطبيق "ميديكير" الذكي؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك / حدد:.....

18. ما هي الطريقة التي تفضلها لاستلام نتائج الفحوصات المخبرية للمريض؟

□ البريد الالكتروني □ الفاكس

□ الاستلام الورقي من المريض □ تطبيق "ميديكير" الذكي

19. هل لديك حساب في أي من التطبيقات التالية؟

19.1 بريد الكتروني □ لا □ نعم / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

19.2 فيسبوك □ لا □ نعم / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

19.3 تويتر □ لا □ نعم / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

19.4 انستغرام □ لا □ نعم / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

19.5 معلومات صحية □ لا □ نعم / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

19.6 تطبيقات اخرى؟ أذكرها:

..... / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

..... / مدى استخدام التطبيق؟ □ يوميا □ أسبوعيا □ شهريا □ غير ذلك حدد:.....

(ب) القسم الثاني:

ب.1 قياس مدى سهولة استخدام تطبيقات "ميديكير" الذكية:

الرقم	العبارة	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	كان تعلم استخدام التطبيق سهل بالنسبة لي					
2	تم تدريبي بشكل كافي على استخدام التطبيق من قبل طاقم مختبر ميديكير					
3	أمتلك الخبرة الكافية في التعامل مع تطبيقات الويب والهاتف المحمول					
4	وجدت ان التطبيق واضح ومفهوم					
5	وجدت ان استخدام التطبيق ممتع					
6	التصميم الداخلي للتطبيق واضح ومريح					
7	التنقل داخل التطبيق سهل					
8	عملية البحث داخل التطبيق سهلة					
9	التطبيق يعمل بدون أخطاء					
10	عملية الوصول لنتيجة الفحص المخبري عبر التطبيق سهلة					
11	بشكل عام، وجدت ان التطبيق سهل الاستخدام					

ب.2 قياس مدى الفائدة من استخدام تطبيقات "ميديكير" الذكية:

الرقم	العبارة	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	مكن استخدام التطبيق من الحصول على نتيجة الفحص المخبري بشكل أسرع					
2	وفر استخدام التطبيق الجهد في الحصول على نتيجة الفحص المخبري					
3	مكن استخدام التطبيق من تشخيص المريض بشكل أسرع					
4	زاد التطبيق من جودة الخدمة الصحية المقدمة من قبل المختبر					
5	ساعد التطبيق في الاحتفاظ بنتائج الفحوصات المخبرية					
6	سهل التطبيق من التواصل مع المختبر من خلال المعلومات المتوفرة عن الفروع وأرقام الهواتف					
7	التطبيق لا يسيء استخدام المعلومات الخاصة بالمريض					
8	أجيد فهم نتيجة الفحص المخبري والتعامل مع المفاهيم الطبية من خلال التطبيق					
9	نتائج الفحوصات صحيحة ودقيقة عبر التطبيق					
10	أستفيد من الحملات والعروض التي تقدمها مختبرات ميديكير عبر التطبيق					
11	استلمت نتيجة الفحص المخبري في الوقت المناسب					
12	التطبيق مفيد في فترات ضغط العمل					
13	سهولة استخدام التطبيق زادت من الفائدة المدركة منه					
14	وجدت أن التطبيق مفيد					

ب.3 قياس الاتجاه لاستخدام تطبيقات "ميديكير" الذكية:

الرقم	العبارة	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	أشعر بالراحة في استخدام التطبيق					
2	أستمتع باكتشاف المزايا الجديدة في التطبيق					
3	أفضل طريقة الاستلام الالكتروني لنتائج الفحوصات المخبرية					
4	الى جانب استلام نتيجة الفحص المخبري عبر التطبيق، فأنني أيضا أفضل استلامها ورقيا					
5	أستخدم التطبيق كلما احتجت له					
6	أثق بأن التطبيق يحمي خصوصية المعلومات الصحية					
7	أقوم بتفقد التطبيق بمجرد وصول نتيجة الفحص المخبري					
8	أنا راض عن التطبيق					
9	أرى أن اضافة التطبيقات الالكترونية للجانب الصحي مفيدة					

ب.4 قياس النية لاستخدام تطبيقات "ميديكير" الذكية:

الرقم	العبارة	موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
1	أوصي الآخرين باستخدام التطبيق					
2	لدي النية في استخدام التطبيق بشكل مستمر					

(ت) القسم الثالث:

أية مشاكل واجهتك في استخدام التطبيق؟.....

.....

أية ملاحظات أخرى تود اضافتها؟.....

نهاية الاستبانة ـ شاكرون لكم تعاونكم

Appendix (2): English Survey Questionnaire

(A)First Section: Demographic Information

Please answer demographic data using correct number when there is a numeric answer. For other questions, put an (x) sign beside the appropriate answer:

1. **Gender:** **□Male □Female**
2. **Age: .....**
3. **Place of Residence (City/Town): .....**
4. **Monthly Income to the Whole Family: .....**

5. **Description:** **□Patient □Physician**

5.1 If the description is "Patient",

5.1.1 Educational Level? **□Elementary □Preparatory □Secondary**
□ University/Major? .....
□ Other/Specify? .....

5.1.2 Occupation? .....

5.2 If the description is "Physician",

5.2.1 Medical Rank? **□ General Physician**
□ Specialist Physician/Specialty: .....

5.2.2 Total Years of Experience? .....

5.2.3 Years of Experience in current Place: .....

6. **Is the Internet available at Work place/at clinic?** **□Yes** **□No**
7. **Is the Internet available at Home?** **□Yes** **□No**
8. **Do you have a Computer/Laptop?** **□Yes** **□No**
9. **Do you have a Smartphone?** **□Yes** **□No**
10. **Do you use 3G service?** **□Yes** **□No**
11. **Do you have the knowledge of using Smartphone or Web Apps?** **□Yes** **□No**

12. Number of using the Internet per day? .....

13. In addition to "Medicare" App., do you use other e-health Apps? □ Yes □No

13.1 If the answer is "Yes", how many e-health Apps do you use?.....

14. Is there any reason that prevents you from using Smartphone or Web health Apps?

□Yes □No

14.1 If the answer is "Yes", Mention the reason:

.....
.....

15. Do you trust the use of health information technology or e-health Apps?

□Yes □No

16. The length of using "Medicare" app per month? .....

17. To what extent do you use "Medicare" app?

□Daily □Weekly □Monthly □ Other/Specify?.....

18. How would you like to receive the lab test result?

□Email □Fax □Paper □ "Medicare" app

19. Do you have an account for the following Apps?

19.1 Email: □No □Yes/ The extent of use? □Daily □Weekly □Monthly □ Other

19.2 Facebook: □No □Yes/ The extent of use? □Daily □Weekly □Monthly □ Other

19.3 Twitter: □No □Yes/ The extent of use? □Daily □Weekly □Monthly □ Other

19.4 Instagram: □No □Yes/ The extent of use? □Daily □Weekly □Monthly □ Other

19.5 Health Information:

□No □Yes/ The extent of use? □Daily □Weekly □Monthly □ Other

19.6 Other Apps? Mention them:

...../ The extent of use? Daily □Weekly □Monthly □ Other

...../ The extent of use? Daily □Weekly □Monthly □ Other

(B) Second Section:

B.1: Measuring the Perceived Ease of Use (PEOU) of "Medicare" Apps:

#	Sentence	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Learning to operate the app. has been easy for me					
2	I have been trained enough to use the app. By Medicare lab staff					
3	I have sufficient experience in using web and mobile applications					
4	My interaction with the app. is clear & understandable					
5	I find the app. is enjoyable to interact with					
6	The interior design of the app. is clear and comfortable					
7	It is easy for me to become skillful at using the app & navigating it.					
8	I find it easy to get the app. to do search					
9	The app. works without errors					
10	I find it easy to get the app. to show lab test result					
11	I find the app. easy to use					

B.2: Measuring the Perceived Usefulness (PU) of "Medicare" Apps:

#	Sentence	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Using the app. enables me to get lab test result more quickly					
2	Using the app. saves effort to get lab test result					
3	Using the app. enables diagnosing of patient more quickly					
4	Using the app. helps back up lab test results files					
5	Using the app. facilitates communication with lab through information provided about branches & Telephone numbers					
6	Using the app. increases the quality of lab service					
7	The app. does not misuse patient's information					
8	I find it easy to understand test result & medical definitions through the app.					
9	Lab test result is true & accurate through the app.					
10	I benefit from Medicare labs offers & campaigns through the app.					
11	I have received test result on time through the app.					
12	I find the app. useful in my stressful work periods					
13	Perceived ease of use of the app. increases perceived usefulness of the app.					
14	I find the app. useful					

B.3: Measuring the attitude toward using "Medicare" Apps:

#	Sentence	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I feel comfortable while using the app.					
2	I enjoy discovering new features of the app.					
3	I prefer the electronic way of receiving lab test result					
4	I prefer receiving paper lab test result manually beside receiving it through the app.					
5	I use the app. whenever I need it					
6	I trust the app. maintains the privacy of health information					
7	I search the app. upon receiving the result					
8	I am satisfied with the app.					
9	I realize that adding electronic apps to the health sector is useful					

B.4: Measuring the intention to use "Medicare" Apps:

#	Sentence	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I recommend others to use the app.					
2	I intend to use to use the app. continuously					

(C) Third Section

Problems you faced with using theapp?.....
.....
Notes you like to add?.....
.....

End of questionnaire-Thanks for kind cooperation

Appendix (3): Referees of the Questionnaire

Name	Title	Location
Dr. Hussein Jabareen	Supervisor	Hebron University
Dr. Shahenaz Najjar	Assistant Professor	The Arab American University-Ramallah
Dr. Mohamad Khleif	Assistant Professor	Hebron University
Dr. Yousef Jaradat	Assistant Professor	Bethlehem University
Dr. Tariq Tamimi	Lecturer	Hebron University

Appendix (4): Letter to Medicare Medical Laboratories Company

الجامعة العربية الأمريكية
ARAB AMERICAN UNIVERSITY

كلية الدراسات العليا

حضرة الدكتور بشار الكرمي
رئيس مجلس ادارة مختبرات ميديكير
تحية طيبة وبعد،

الموضوع: تسهيل مهمة الطالبة بشرى شلالدة

فارجو من حضرتكم التكرم بالسماح للطالبة بشرى شلالدة والتي تدرس في برنامج ماجستير المعلوماتية الصحية / الجامعة العربية الأمريكية في جنين، القيام بجمع معلومات بحثية من الأطباء والمرضى الذين يتعاملون مع مختبرات ميديكير ويتلقون نتائج الفحوصات المخبرية من خلال تكنولوجيا الويب والموبايل في محافظة الخليل، علما أن هذه المعلومات سوف تستخدم فقط لأغراض البحث العلمي الذي تقوم به تحت إشراف الدكتور حسين الجبارين (عميد كلية التمريض والعلوم الصحية في جامعة الخليل) وعنوانه "مدى تقبل الأطباء والمرضى لتلقي نتائج الفحوصات المخبرية الطبية من مختبرات ميديكير الطبية عبر تطبيق الويب والهاتف المحمول في محافظة الخليل كمثال على تطوير الخدمات الصحية من خلال استخدام التطبيقات التكنولوجية"، ليتسنى لها استكمال متطلبات التخرج للحصول على درجة الماجستير في المعلوماتية الصحية.

كما أود اعلامكم ان لجنة الدراسات العليا في قسم المعلوماتية الصحية / الجامعة العربية الأمريكية، قد اجازت للطالبة المذكورة القيام ببحثها، ووجد انه قابل للعمل ومفيد لتطوير الخدمات الصحية، ولا يتعارض و أخلاقيات البحث العلمي الصحي، ولا يرى أنه سيكون هنالك أي تاثير أو ردة فعل سلبية يسببه الاشتراك في هذه الدراسة سواء للمشارك في تعبئة الاستبيان أو أماكن اجراء الفحص الطبي المخبري.
بل تهدف هذه الدراسة بشكل أساسي الى تقييم مدى تقبل الأطباء والمرضى لاستخدام التطبيقات التكنولوجية المستخدمة من قبل مختبرات ميديكير مثل تطبيق الهاتف المحمول (ميديكير)، وكذلك تطبيق الويب المستخدم من قبل الطبيب (portal) وقياس مدى تأثيرها في جودة الخدمة الصحية المقدمة من قبل مختبرات ميديكير كوسيلة للتعزيز التكنولوجي في القطاع الصحي وذلك من خلال توزيع استبيان على عينة من الأطباء الذين يستخدمون التطبيق ويتعاملون مع مختبرات ميديكير، وكذلك على عينة من المرضى الذين يستخدمون تطبيق الهاتف المحمول.

لقد تم التأكد من اتباع الطالبة لقوانين الجامعة العربية الأمريكية بالمراعاة في تصميم بحثها أن تبقى هوية المشاركين مجهولة، لذلك فانه من غير المطلوب كتابة الاسم، العنوان، مكان المختبر الذي يتواجدون فيه، أو أية معلومات تدل على شخصيتهم. وانه في حال الموافقة على المشاركة في هذه الدراسة، ستبقى آرائهم طي الكتمان.

في حال موافقتكم الكريمة، سيتم تزويدكم بورقة مفصلة حول الدراسة قبل البدء بجمع المعلومات، ونسخة عن رسالة الماجستير بعد الانتهاء من اعدادها. ونتعهد بعدم عرض أو نشر نتائج الدراسة في المستقبل الا بعد الحصول على موافقتكم حسب الأصول.

مع فائق الشكر و جزيل الاحترام

مشرف الدراسة: د. حسين جبارين

Dr. Hussein Jiw

Appendix (5): Medicare Medical Laboratories Company Agreement

حضرة الدكتور حسين جبارين /عميد كلية التمريض/جامعة الخليل المحترم

تحية وبعد ,,,

الموضوع : طلبكم تسهيل مهمة الطالبة بشرى شلالده

بناءاً على الكتاب الموجه من حضرتكم بتاريخ 2020 /3/1 بخصوص تسهيل مهمة الطالبة بشرى شلالده الخاص بجمع معلومات بحثية من الاطباء والمرضى الذين يتعاملون مع مختبرات ميديكير ويتلقون نتائج الفحوصات المخبرية من خلال تكنولوجيا الويب والموبايل في محافظ الخليل فاننا نشكر لكم اهتمامكم بهذا الجانب الحيوي و يسعدنا التعاون معكم ضمن المحددات التالية:-

1. التزاما منا بحقوق المريض بالحفاظ على سرية المعلومات وعدم تزويدها لاي جهة دون موافقتهم المكتوبة فاننا نعتذر عن تزويد الباحثين بمعلومات تتعلق بملفات المرضى الحاليين لدينا.
2. نرحب بالطالب/ الباحث للحضور الى مختبرنا للاتصال المباشر مع المراجعين (لمن يرغب منهم) لاخذ موافقتهم الخطية مسبقا للمشاركة بالبحث.
3. سوف يتم تخصيص مكان في الاستقبال للطالب/ الباحث لاتمام عمله و بمساعدة فريق ميديكير و بما لا يؤثر سلبا على سير العمل في المختبر .
4. يمكنكم/ يمكن للطالب اعداد ياقطة/ بانر تشير الى مهمته تحمل شعار الجامعة و توضع على الاستقبال لاعطاء فكرة للمراجعين عن البحث/ اهدافه و تشجيع مشاركتهم فيه.

برجاء ابلاغنا بموافقتكم للاتفاق على صيغة بروز اسم مختبرات ميديكير في البحث و الافادة من المخرجات فيه.

املين لكم ولطلابكم التوفيق والنجاح.

المدير العام
د بشار كرمي

Pathology Consultants
مختبرات ميديكير

شركة النخبة للخدمات والاستشارات الطبية

د. بشار عدنان الكرمي
رئيس مجلس الادارة
المدير التنفيذي

Elite Medical Services & Consultancy Company

Dr. Bashar A Karmi
Board Chairman - CEO

Tel: 00972 2 945453
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Palestine - West Bank
Ramallah - P.O.Box: 2024
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ملخص الدراسة

أصبحت تطبيقات المعلومات الصحية التكنولوجية متاحة بشكل متزايد وبدأ استخدامها مؤخرا في البيئة الفلسطينية. ميديكير هي شركة مختبرات طبية فلسطينية بدأت في استخدام تطبيقات الهاتف المحمول والويب لإرسال نتائج الفحوصات المخبرية للأطباء والمرضى إلكترونيًا، ولا توجد دراسات سابقة أجريت لتقييمها وقياس مدى تقبلها من قبل المستخدمين كمثال على تطوير الخدمات الصحية الفلسطينية.

كان الهدف من الدراسة الحالية هو استخدام نموذج قبول التكنولوجيا (TAM) لوصف مدى تقبل المرضى والأطباء الذين يستخدمون تطبيقات (ميديكير) للهاتف الذكي و الويب في محافظة الخليل، والعوامل التي تؤثر على تقبلهم. أيضًا، لقياس تأثير استخدام تطبيقات (ميديكير) كمثال، على جودة خدمات الرعاية الصحية المقدمة.

أجريت هذه الدراسة الوصفية المقطعية في محافظة الخليل، تحديدا في الفروع الأربعة لمختبرات ميديكير الطبية وهي فرع الخليل، الظاهرية، يطا، ودورا، في الفترة من ٩ سبتمبر إلى٢٠ أكتوبر ٢٠٢٠ باستخدام الاستبانة الورقية. احتوت الاستبانة على مجموعة من الأسئلة وعناصر لقياس التراكيب الرئيسية ل (TAM)، حيث تم إرسال ١٢٠استبانة للمرضى والأطباء، وتم جمع ١١٣ استبانة بمعدل استجابة (٩٤,٢٪). شكل الذكور (٥٤٪) والاناث (٤٦٪) من مجموع المشاركين، بمتوسط اعمار ٣١,٢ سنة. شكل المرضى (٧٣,٥٪) وشكل الأطباء (٢٦,٥٪). هناك ٤٢ مشترك من مدينة الخليل والباقي (٧١) مشترك من مدن مختلفة في محافظة الخليل.

كان مستوى جميع التركيبات الأساسية (سهولة الاستخدام المدركة، الفائدة المدركة، الموقف تجاه الاستخدام، النية السلوكية للاستخدام) عالي مما يعني أن تطبيقات (ميديكير) للهاتف الذكي و الويب كانت سهلة الاستخدام ومفيدة وبالتالي كان لدى المستخدمين توجه عالي ونية سلوكية عالية لاستخدامها وذلك يشير إلى أن مستوى تقبل المرضى والأطباء لاستخدام تطبيقات (ميديكير) عالي. و أكدت نتائج الدراسة الحالية النتائج الأصلية لنموذج (TAM) حيث كانت هناك ارتباطات إيجابية وهامة بين ١) (سهولة الاستخدام المدركة) من قبل الأطباء والمرضى لتطبيقات (ميديكير) و الفائدة المدركة و موقفهم تجاه استخدامها، ٢) (الفائدة المدركة) من قبل الأطباء والمرضى و موقفهم تجاه استخدامها وكذلك النية السلوكية لاستخدامها، ٣) موقف الاطباء والمرضى تجاه استخدامها والنية السلوكية لاستخدام تطبيقات (ميديكير).

كذلك، حددت هذه الدراسة العوامل الخارجية التي أثرت بشكل كبير وإيجابي على التركيبات الرئيسية ل (TAM) ثم على التقبل العام لاستخدام تطبيقات (ميديكير) الإلكترونية والتطبيقات الصحية الالكترونية الأخرى وتشمل هذه العوامل: توفر الإنترنت في المنزل ومكان العمل، الكفاءة الذاتية للمستخدم في استخدام تطبيقات الهاتف المحمول والويب، وتدريب المرضى والأطباء من قبل طاقم ميديكير على استخدام تطبيقات (ميديكير)، والتصميم الداخلي لتطبيقات (ميديكير)، وثقة المرضى والأطباء في استخدام تطبيقات (ميديكير).

بالإضافة إلى ذلك، أظهرت الدراسة الحالية بعض الاختلافات بين تقبل المشتركين وفقًا لبعض الخصائص الديموغرافية والشخصية وتشمل: مكان الإقامة، والوصف (مريض أو طبيب)، والمستوى التعليمي، وامتلاك كمبيوتر أو لابتوب، واستخدام 3G ، والمعرفة العامة باستخدام تطبيقات الهاتف المحمول و الويب، واستخدام التطبيقات الصحية الالكترونية، والفترة الزمنية لاستخدام تطبيق (ميديكير)، ومدى استخدام تطبيق (ميديكير)، والطريقة المفضلة للمستخدم لتلقي نتائج الفحوصات المخبرية (تطبيق (ميديكير)، البريد الإلكتروني، الفاكس، الورق).

فيما بعد، أظهرت النتائج أن استخدام تطبيقات (ميديكير) للهاتف المحمول والويب أثر بشكل إيجابي وكبير على جودة الخدمات التي تقدمها الشركة. وأكدت نتائج العلاقات في هذه الدراسة إمكانية تصميم وتطوير تطبيقات معلومات صحية تكنولوجية أخرى في فلسطين.