INTERNATIONAL JOURNAL OF RESEARCH IN BUSINESS AND SOCIAL SCIENCE 8(6)(2019) 181-200

Business & Social Science
IJRBS

Research in Business & Social Science

IJRBS VOL 8 NO 6 ISSN: 2147-4478

Available online at www.ssbfnet.com
Journal homepage: https://www.ssbfnet.com/ojs/index.php/ijrbs

Understanding the insight of factors affecting mHealth adoption: A systematic review

Md. Abdul Kaium[a], Yukun Bao[a], Mohammad Zahedul Alam[b], Najmul Hasan[a], Md. Rakibul Hoque[c]*

[a]*Center for Modern Information Management, School of Management, Huazhong University of Science and Technology, Wuhan, 430074, P.R. China*
[b] *School of Management, Wuhan University of Technology, China*
[c] *Management Information Systems, University of Dhaka, Bangladesh*

ARTICLE INFO

Article history:
Received 14 September 2019
Received in revis. form 29 Sep. 2019
Accepted 05 October 2019

Keywords:
mHealth
Adoption
Factors
A systematic review
JEL Classification:
O15
P36

ABSTRACT

Numerous studies have addressed the different context of mHealth services among diverse user groups. But due to a lack of understanding the insight of factors affecting the mHealth adoption, it's crucial need to conduct a systematic review on this issue. The objective of this study was to synthesize the present understanding of the influential factors of mHealth adoption. We performed a systematic literature search on eight electronically reputed scientific databases from 2010 to March 2019, such as Science Direct, Springer, IEEE Xplore, JMIR, Taylor & Francis, Emerald, Mary Ann Liebert and Google Scholar. This was accomplished by gathering data including authors, countries, years, target population, sample size, models/theories, and key influential factors. Primarily, a total of 2969 potentially relatable papers were found, of which 50 met the inclusion criteria. It was found that cross-sectional approach, survey methods and structural equation modeling (SEM) were the most explored research methodologies whereas PLS-SEM was found to be the largest used analysis tools. From the analysis, a total of ninety-four influential factors were clearly recognized and the findings represent that the following 15 factors appeared most recurrently and significantly; perceived usefulness, perceived ease of use, social-influence, subjective norms, self-efficacy, trust, facilitating conditions, technology anxiety, performance expectancy, effort expectancy, cost, attitude, resistance to change, perceived privacy and security, and perceived behavioral control. The research results have significant theoretical and practical implications for mHealth services providers, researchers and policy makers with regards to the Sustainable Development Goals (SDGs) allied to healthcare. This is the first initiative that has widely reviewed the literature on factors influencing the adoption of mHealth and given accumulative understanding of these factors to the researchers.

Introduction

The digitalization of healthcare can increase efficiency and allows for the provision of better-quality healthcare services, offering with many benefits to stakeholder (Laurenza, Quintano, Schiavone, & Vrontis, 2018). Recently, many innovative technological solutions have been appeared to solve people's health-related needs (Ashraf, Hasan, Lewis, Hasan, & Ray, 2017; Esposito et al., 2018). As an evolving healthcare sector, mobile health (mHealth) services have been receiving increasing attention in latest years as an alternative solution (Zhao, Ni, & Zhou, 2018). Over the past two decades, mHealth has developed into a significant channel for healthcare services delivery and promotion (Steinhubl, Muse, & Topol, 2015). A number of mHealth services and applications around the world have already been introduced by main stakeholders – mobile operators, healthcare providers, device suppliers,

* *Corresponding author.* ORCID ID: *0000-0001-5418-8799*
Peer review under responsibility of Bussecon International Academy.

https://doi.org/10.20525/ijrbs.v8i6.522

content players, foundations, non-government organizations (NGOs) and governments (PWC, 2012). Consequently, users progressively use mHealth facilities to satisfy their requirements, manage their health and communicate with their suppliers (Brown III, Yen, Rojas, & Schnall, 2013). In recent years, mHealth has gained more popularity in developing countries where many governments are recognizing the possible benefits of mHealth and have integrated it into their plans to meet their health system target such as Sustainable Development Goal (SDG) targets 3 (Ensure Healthy Lives and Promote Well Being for All at All Ages).

Although, various mHealth initiatives have been undertaken across the world, but the adoption rate is significantly low. Many mHealth projects have been postponed due to a lack of awareness about mHealth services. Most of the health service-related initiatives have not been able to sustain or obtain optimal results (Chandwani, De, & Dwivedi, 2018). However, there are some widely accepted models identifying the influential factors for technology adoption in mHealth research, still there are some limitations of these models used. It has been observed that there are diversified conflicting factors affecting the adoption intention of mHealth services among the end users. There is theoretically no conflict among the factors affecting the adoption of mHealth services but empirically there are conflicts among the constructs. So, it raises questions regarding the factors affecting the adoption of mHealth services. Hence, it is required to administer a systematic literature review on the factors affecting the adoption of mHealth services.

Therefore, the current research aims to conduct a systematic literature review on understanding the factors behind mHealth adoption, i.e. firstly, to carry out a systematic review of the factors affecting the adoption of mHealth services. Secondly, to clarify the most key factors and thirdly, to reconfirm the outcomes of past research with regard to the factors for mHealth adoption. Finally, the research provides a fresh, easy and simplest way of understanding, but an extensive conceptual framework for adopting mHealth. This study unveils the key factors behind the adoption of mHealth services in developed and developing countries and to provide a comprehensive model covering the influential factors of this service. However, researchers and academicians find this paper more useful for understanding the concept and further exploration in mHealth adoption research from insights and future research direction.

The rest of this paper is organized as follows; the next section describes the literature review, the methodologies used in this study followed by a review of the 50 selected studies. The results are detailed in subsequent sections and finally, it includes discussions, conclusion, limitations, and future research directions.

Literature Review

Research on healthcare applications design for mobile devices (mHealth) has gained growing attention over the past decade (Miah, Gammack, & Hasan, 2017). The applications of mHealth have been widely, and there has been a development of many new services that have not only changed health delivery systems but have also improved the effectiveness of health care services (Sadegh, Saadat, Sepehri, & Assadi, 2018). mHealth has been described as mobile-supported medical and public health procedures such as mobile phones, personal digital assistants (PDAs), patient surveillance systems and other wireless devices (Greenspun & Coughlin, 2012). However, mHealth has been proposed as one of the alternative solutions to improve access to high-quality emergency care. It is seen as a simple and inexpensive solution for improving worldwide access to healthcare facilities, particularly in resource shortages (Källander et al., 2013). It can, however, encourage the goals of persuading individuals to embrace the technology because of the cost, accessibility and coverage benefits of technology (Srisawangwong & Kasemvilas, 2014), the integration with internet (Yusof & Iahad, 2012), the capacity to monitor illnesses and provide essential data to physicians who can then assist users more efficiently in recovery and well-being (Kalem & Turhan, 2015). Moreover, mHealth can improve the efficiency of healthcare workers for providers and distributors, i.e. physicians, healthcare workers and hospitals, decrease expenses for patients looking for medical care and enhance the overall quality of services (Bjornland, Goh, Haanæs, Kainu, & Kennedy, 2012).

The mHealth literature focusing on developed and developing countries has certainly flourished in recent years. Recent proof suggests that mHealth may be an ICT derived blessings and one of the most prominent services with significant impacts on the healthcare industry's growth (Chiarini, Ray, Akter, Masella, & Ganz, 2013; Md Rakibul Hoque, Mazmum, & Bao, 2014; Mechael et al., 2010; Sharifi et al., 2013). But the unending task of confirming user acceptance of innovative technology is an endless leadership challenge (Schwarz & Chin, 2007), and research into technology adoption and diffusion is now regarded among the more mature fields of exploration in the present context (Venkatesh, Morris, Davis, & Davis, 2003). This significant amount of activity has seen the use of a broad spectrum of exploratory methods that examine many distinct systems and technologies in diverse contexts, to the extent that even the most cursory examination of the current literature reveals a variety of stakeholder's perspectives, contexts, technologies, units of analysis and models/theories of research (Williams, Dwivedi, Lal, & Schwarz, 2009).

From the extant literature described later part of the study, it has been observed that many different researchers with different research intentions and subjects of focus have conducted mHealth researches by applying a variety of research methodologies in different environmental context. This diverse body of work has seen numerous new constructs being incorporated into the original

and widely accepted theories, i.e. TAM, UTAUT, UTAUT2 and on occasion, a re-specification of the underlying relationships between variables. These research papers were published in journals and conferences in diverse streams of study.

Researchers have regularly called for theoretically based interventions, suggesting the increased likelihood of meeting success criteria (Krishna, Boren, & Balas, 2009), yet few studies examine the systematic review on the underlying factors for mHealth adoption. Recent reviews of mHealth provide a range of analyses focusing on particular technological features, process, improvements in healthcare service delivery, and behavior change and healthcare outcomes. A majority of the reviews chose to use methodological standards as an inclusion and exclusion criterion, limiting the reviews to cross-sectional, survey methods, specific context and meta-analysis found within the peer-reviewed literature.

However, a considerable amount of research has been conducted across the world i.e. (different context, users and diseases). But, as per our knowledge, no systematic research was being conducted on understanding the insight of factors affecting mHealth adoption. To overcome these limitations, a systematic literature review is required to explore the most dominant factors behind the adoption of mHealth services. Therefore, the main focus of studies has been on inputs, while research in influencing factors and underlying theory is missing.

Materials and Method

This research followed a systematic review process of retrieving data from credible databases. Saunders (2011) described that a systematic review of literature starts with the definition of suitable keywords used in the search and retrieval of literature from databases and the presentation of the analysis. Tranfield, Denyer, and Smart (2003) argued that the purpose of a literature review is to define literature gaps and limitations of the knowledge. In addition, literature review summarizes and sorts current researches on the basis of key themes and recommendations for future works (Seuring, Müller, Westhaus, & Morana, 2005). Despite the fact that this strict proof-based strategy has been used particularly in medical scientific studies, the transition from medicine to other fields to practice dependent on the best accessible evidence (Tranfield et al., 2003). The processes used to carry out the systematic review in the present research are based on the initial rules suggested by Kitchenham (2004) & Kitchenham et al. (2009).

An original scoping research was performed in order to investigate the most suitable search approach, and the results were talked about with different researchers and bagged in a review protocol with specific depictions of the techniques used. A predefined protocol is often needed to decrease the researchers ' potential for bias (Kitchenham et al., 2009). The key information concerning the search strategy covered in the protocols are presented in the followings;

Database Searched

A comprehensive systematic search of the pertinent academic literature was performed from 2010 to March, 2019 as extensive searches using the following electronic databases: Science Direct, Emerald, IEEE Xplore, Taylor & Francis, Springer, Mary Ann Liebert Inc., and Google Scholar and a specific journal database JMIR. The papers were searched through an extensive list of topics due to the multidisciplinary nature of the field researched (mHealth), but the primary focus stayed on the view of mHealth adoption, in line with the review issue. Moreover, reference lists of relevant researches and personal collections were also searched. However, documents published before 2010 were excluded from this study.

Additionally, a gray literature search was also undertaken examining articles and websites from relevant organizations including WHO, International Telecommunications Union (ITU), the mHealth Alliances (mhealthalliance.org), Health Unbound (healthunbound.org), mHealth Knowledge (mhealthknowledge.org), Global mHealth Initiatives (jhumhealth.org), and Google searches, etc. Furthermore, duplicate citations and referencing across databases were recognized and excluded using Endnote, and for verification, a manual revision was performed. If a research was stated in more than one publication and the same information were submitted, the latest publication was included only. However, in multiple publications describing the same research, if innovative information were submitted, all were also included.

Searched Terms

we adapted the experimental results suggested by Dieste, Grimán, and Juristo (2009) regarding the development of an optimum search strategy to identify the most suitable search terms. By considering the objectives of this review to survey as many empirical studies as possible related to the adoption of mHealth, the term's 'Health' and 'mHealth' adoption was searched. Similarly, researchers also regarded all possible abbreviations, alternative spellings, and combinations of terms generally linked to the significance of ' mHealth acceptance ' and extracted from the scoping research, literature review, and discussions with other researchers in their attempts to be thorough. Search terms such as {'mHealth' and/or 'adoption'}, {'mobile health', and/or 'adoption', {'factors influencing mHealth adoption', and/or 'mobile health adoption'}, {'mHealthcare', and/or 'mobile healthcare} adoption', [{'self-care'}, and/or {mHealth and/or 'mobile health}]'were used here. Finally, the following themes related to mHealth

adoption: 'acceptance', 'acceptability', 'utilization', or 'attitude' toward using mHealth services were also searched. The different combinations produced from these keywords were also used to define related studies that were conducted to identify factors influencing the adoption of mHealth. It has been observed that maximum common words used in the title are health, mobile, use followed by ' Acceptance and use,' 'mobile health services', and so on shown in the following figure 1.

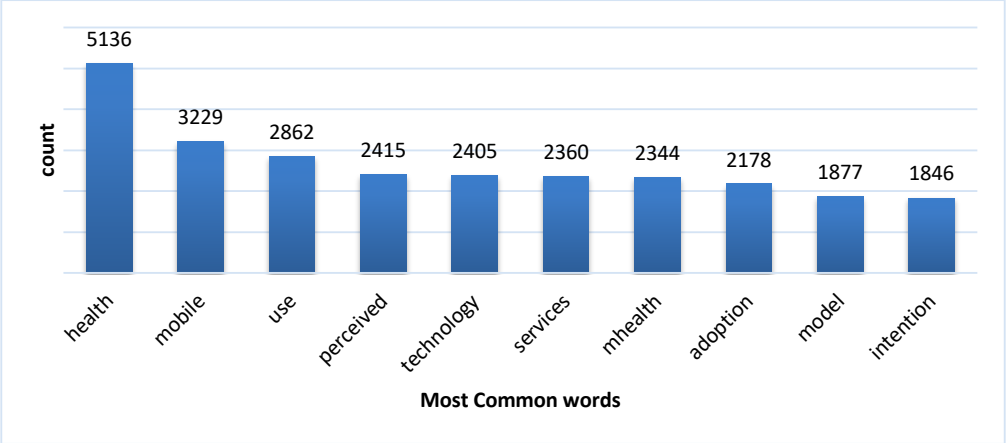

Figure 1: Most 10 Frequently used word in the sample articles (Source:Authors' Study)

Furthermore, Figure 2 presented the word cloud which has been derived from the software, highlighting the most common words in bigger and bold fonts, in contrast, others relatively less common words appear in smaller fonts. This word cloud is an simple way to define the common words in a complex setting (Birko, Dove, & V, 2015), and can therefore be used to identify the most common themes and keywords used in publications.

Figure 2: Word cloud for most common words in mHealth publications (Source:Authors' Study)

Inclusion/Exclusion Criteria

Inclusion and exclusion criteria were also developed in advance and agreement was sought among the reviewers shown in Figure 03. The experiments were based on an empirical design, descriptive survey design, literature review and conference proceedings as well as all relevant data. We included studies reporting findings from worldwide that focused only on factors affecting mHealth adoption as part of the overall intervention strategy for primary health monitoring among various groups such as all populations (young, middle-aged and older), patients, Medical Staffs, Physicians, Caregivers, healthcare professionals, general health users, technology providers, Mid-level providers and healthcare workers published between 2010 to March, 2019. The inclusion criteria used to navigate the search were: (1) health behavioral studies that included conceptual model and hypotheses, (2) mHealth affairs

studies.

The exclusion criteria were: (1) articles not related to mobile (2) related to mobile apps (3) not related to healthcare services (4) all technical studies (5) for which the full text was not available online (6) mobile communication technologies, protocols and standards, and (7) in the form of book chapters, tutorials, guest editorials, poster sessions, correspondence, roundtable discussions, comments, position papers, article summaries, prefaces, interviews and unstructured observations. They were also excluded if these health interventions were provided via a conventional fixed telephone line or using a desktop computer via the internet.

A total of 2969 studies were selected; 573from Science Direct,32from Emerald, 43 from IEEE Xplore, 17 from JMIR, 294 from Taylor &Francis, 90 from Springer, 31 from Mary Ann Liebert Inc., and 1889 from Google Scholar. Of these, 1758 studies were found duplicate and not to be related to mobile health adoption. After that 714 articles were not meet the inclusion criteria and exclude more 61 papers which are related to mHealth artifact design. However, more 348 papers were excluded which did not meet research questions, wrong intervention, unavailability of full text and no longitudinal study. Finally, 38 articles were not included due to unmatched with scope in this study and 50 articles were selected for review (see Figure 3).

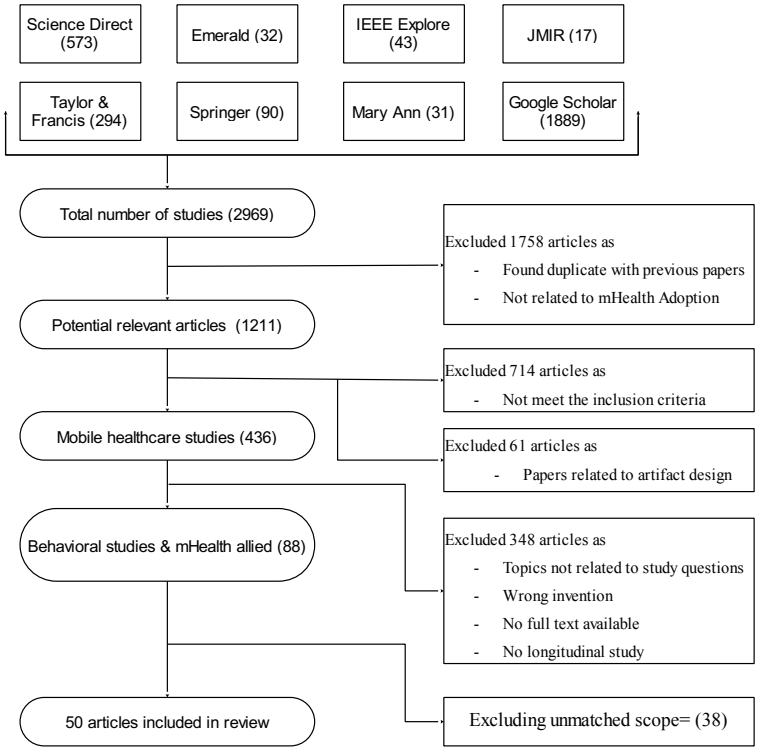

Figure 3: Sample Selection Flow Chart (Source: Authors' Study)

Data Extraction

Authors combined search outcomes from various sources and assessed their eligibility at distinct rates. In order to extract a number of eligible research, abstract screening, title screening and full-text screening were performed in sequence by implementing predefined exclusion and inclusion criteria. An Excel template was developed which outlined mHealth domains and characteristics of the study. Moreover, authors carried out a critical appraisal and verified the results of this quality assessment. Then authors performed test data extractions using this model to verify for any inconsistencies of interpretation of the definitions, and the extraction model was further refined. However, by team agreement, discrepancies in article inclusion, data extraction, and bias evaluation have been resolved. For the purposes of data extraction, an excel spreadsheet was created containing a row for each included review and column to describe the studies and classify the extracted data related to eHealth services implementation.

Reporting the Reviews

One strength of this review is to extend the search of references from which the studies were selected. Furthermore, the 50 articles

chosen that fulfill the inclusion criteria have been evaluated and the findings are described in detail in **Appendix** A. The authors ' names and the years in which the articles were published, countries, independent variables (IV), dependent variables (DV), target population, sample size, and models / theories used by researchers are also presented in the same table, including important findings from the respective research.

Results

In this review, the current status of mHealth adoption by different user groups were also investigated for their healthcare management and have been reported in the literature. Based on the searching in publications/databases, 50 articles were observed to be pertinent in identifying the factors affecting the adoption of mHealth services. Therefore, the systematically selected evidence is synthesized and presented below:

Key Factors

The latent variables having five or more than five frequency of occurrences were incorporated in the following figure 4. Altogether, a total of 72 latent variables were identified as the most positive influential factors, whereas a total of 22 factors were identified as the most negative influential factors for mHealth adoption.

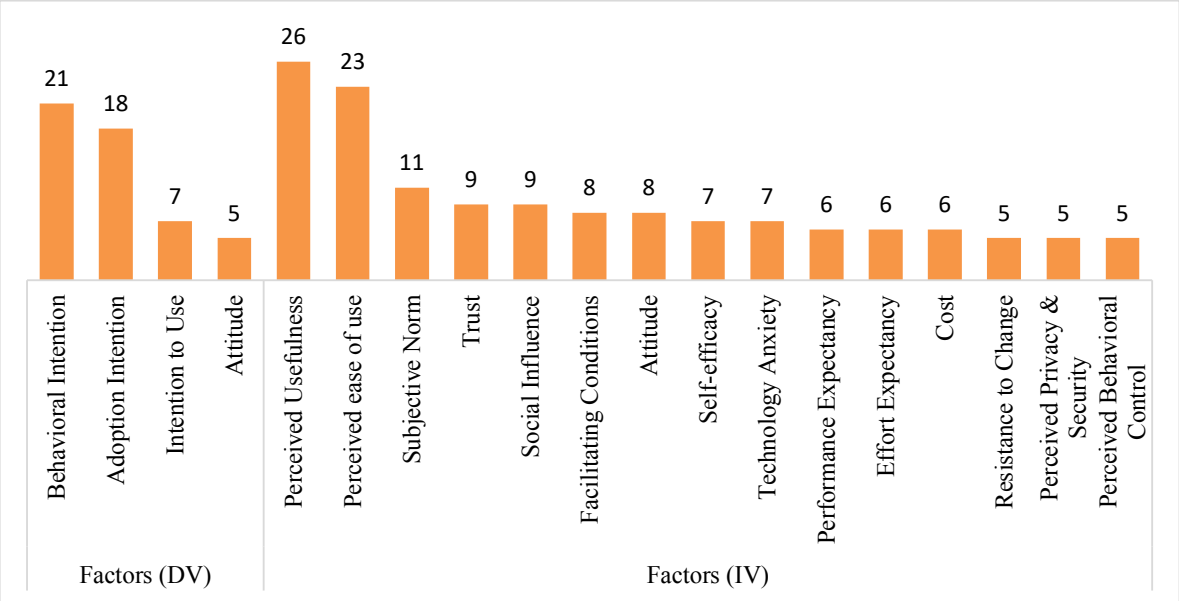

Figure 4: Most significant and highly frequent usages factors (Source: Analysis form Appendix A)

The findings explored that both perceived ease of use and perceived usefulness manifested themselves 26 & 23 times whilst behavioral intention to use emerged 21 times. These two variables were also seen as the most commonly used factors among the previous studies reviewed. Perceived usefulness, perceived ease of use, and self-efficacy had a frequency of 26, 23 and 7 respectively which had an impact directly or indirectly on behavioral intention or via attitude in a different context. While, perceived vulnerability, perceived severity, personal innovativeness in IT, and response efficacy had a frequency of 4 for each construct which stimulate the behavioral intention through the mediation of attitude only which were excluded from the analysis. Moreover, all other factors shown in the figure 4 had a direct significant impact on behavioral intention.

Publication by Countries

All published articles were sorted out on a country by country basis. It was remarkably noticeable in figure 5 that China published the highest number of papers (40%) in mHealth literature followed by Bangladesh (14%). Following that, Taiwan published 8% of the total papers. On the other hand, Jordan, Burundi, and Korea both share 4% of the total published papers. It's become apparent that China dominates the mHealth literature. This could be due to increased awareness of sustainable healthcare services during the last few decades. It is also observed that mHealth adoption researches were conducted mostly in developing countries.

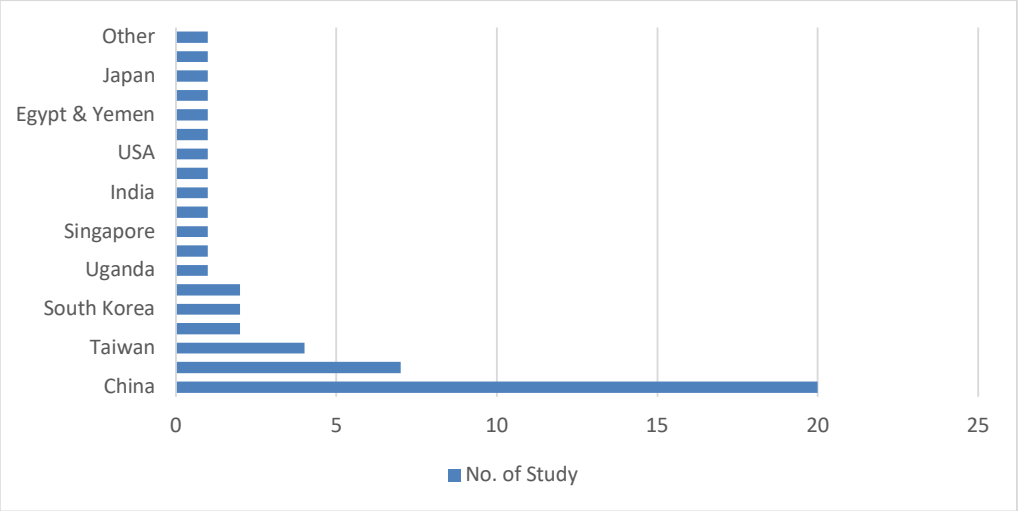

Figure 5: Countries undertaken mHealth adoption research (Source: Analysis form Appendix A)

Publications by Years

Figure 6 demonstrates that the advent of publications on mHealth services started before 2010, followed by balanced growth till the current year. From 2010 onwards, the following figure shows exponential growth and linear forecasting that indicates its potentiality. Likewise, the pattern line additionally shows an expanding design, which means that the mHealth literature continues to grow.

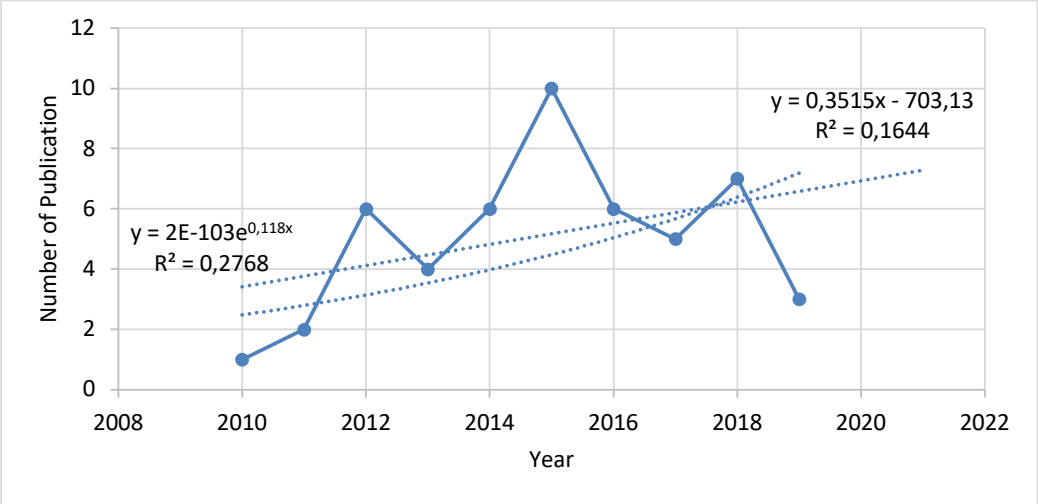

Figure 6: Number of Publications by Year (Source: Analysis form Appendix A)

In 2015, 10 papers were published, which in comparison with prior years is considerably the largest amount of articles. However, it can be concluded that there is constantly expanding trends and interests on mHealth issues, along with rising issues of environmental sustainability, industrial and national pollution, and concerns about social responsibility on the part of both state and corporate bodies.

Models/Theories

Over the last several decades, a plethora of theoretical models/theories have been proposed to examine IS/IT acceptance and usage intention (Yogesh K. Dwivedi, Kapoor, Williams, & Williams, 2013; Yogesh K Dwivedi et al., 2017). Moreover, researchers have used one or more theories or sometimes blended an array of accepted theories in an attempt to elaborate on the notion of technology

acceptance. A thorough examination of the theories / models taken by these research investigates the significance of considering a theoretical basis / base best suited to the view of the customer. The following figure7 shows that most of the studies used an integrated model to identify the factors influencing the adoption of mHealth services. The TAM has, however, been used in quantitative and qualitative studies of healthcare services to determine the factors affecting the acceptance of mobile technology by physicians and medical students respectively, and in health studies on subjects such as the adoption of mHealth services (Cho, 2014).

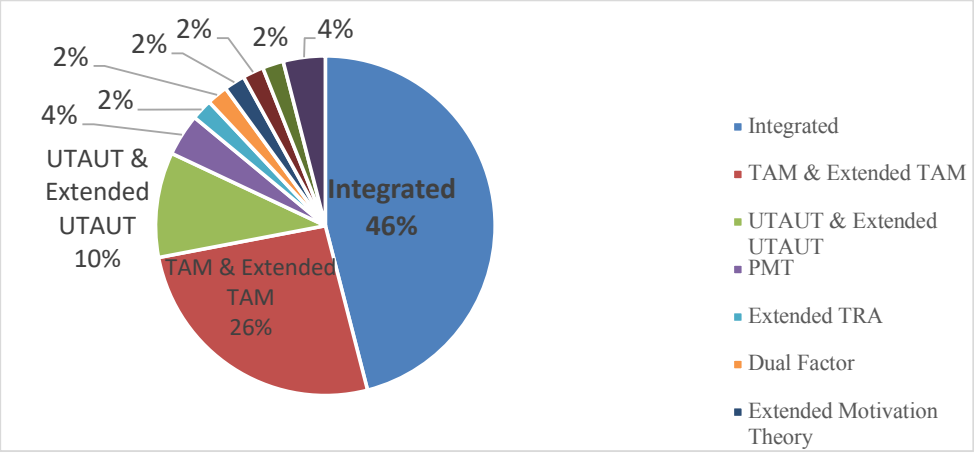

Figure 7: Most frequently usages Theory/ Model (Source: Analysis form Appendix A)

Studies by Target Population

The figure8 illustrated that studies were divided into several categories according to the user's types. Our study reveals that most of the studies emphasized the general users of mHealth services followed by an elderly person. Furthermore, target respondents were categorized on the basis of age. It was also seen that there were some studies on organizational and professional perspective.

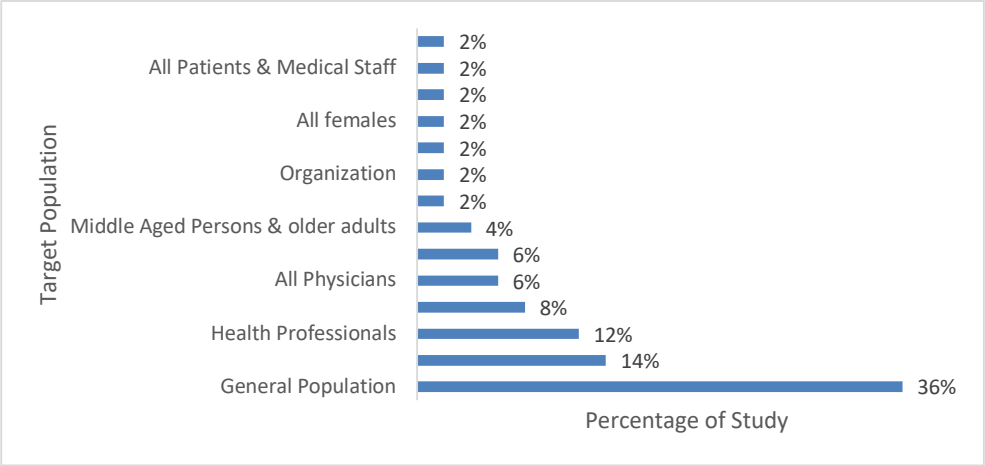

Figure 8: Percentage of Study by Target Population (Source: Analysis form Appendix A)

Publishers/Databases

The following figure9represents the number of articles found in different publishers and databases. Most of the research articles were found in Google Scholar followed by Science Direct. This clearly indicates that researchers and academicians are presently quite varied and widespread for the publication landscape of mHealth adoption.

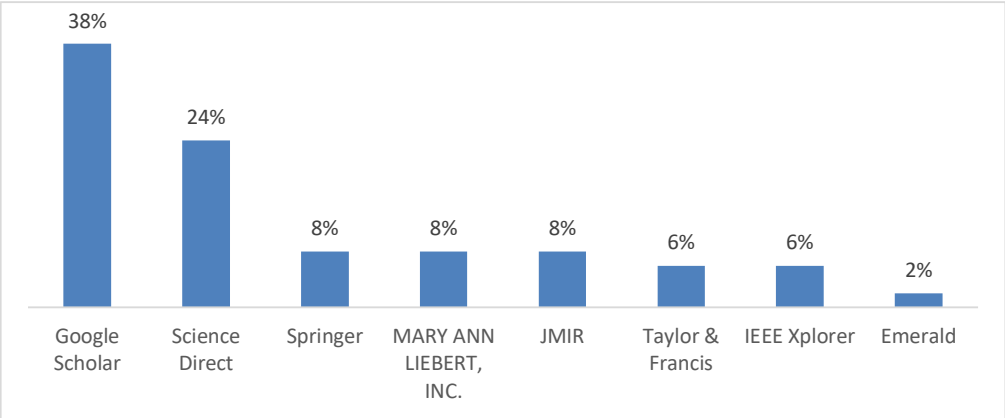

Figure 9: Percentage of Publications by Database (Source: Analysis form Appendix A)

Proposed Comprehensive Model

The following figure 10 represents the comprehensive model derived from systematic review. It includes the most influential factors affecting the adoption intention of mHealth services.

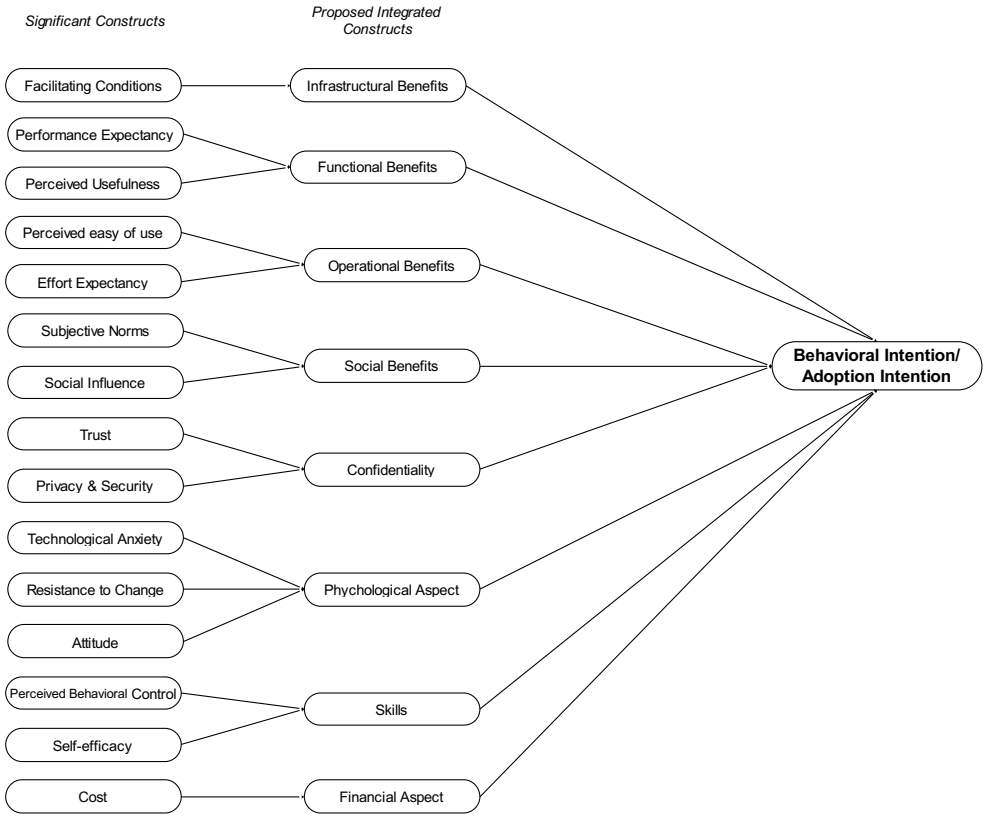

Figure 10: Comprehensive Proposed Model (Source: Authors' Study)

On the basis of the systematic review, 15 most influential factors were identified that affect the adoption of mHealth services shown in the above figure. However, performance expectancy and perceived usefulness were labeled as functional benefits; perceived ease of use and effort expectancy were labeled as operational benefits; social influence and subjective norms were labeled as social

benefits; trust, perceived privacy and security were labeled as confidential benefits; technological anxiety, resistance to change and attitudes were labeled as psychological aspects, cost was labeled as financial aspect, facilitating conditions was labeled as infrastructural benefits, and finally perceived behavioral control and self-efficacy were labeled as skills.

Discussions

The growing evidence for the use of mobile information and communication technologies and the mobility of information in healthcare known as mHealth has attracted the attention of physicians, practitioners, researchers and policymakers worldwide (Free et al., 2010; Leslie, Sherrington, Dicks, Gray, & Chang, 2011; Waegemann, 2010). Our intention in this study was to perform a systematic literature review of the factors affecting the adoption of mHealth services from 2010 to March, 2019 in distinct contexts among distinct user groups. Given the significant attention that mHealth gets worldwide, identifying the factors that facilitate end-user acceptance seemed crucial. The principal results of this research identified that at the organizational, individual and contextual levels, several factors are associated with mHealth adoption. This type of research may offer benefits within the field as it offers an indication for future research growth. New or early career researchers can find a landscape for building a foundation of their own study within the health informatics field.

Among the search engine, Web of Sciences and Google scholar were mostly used for searching the mHealth adoption related research. Our analysis indicates that 50 selected studies were conducted in 19 countries that could identify the predictors affecting the adoption of mHealth service. It has been observed that China was the leading country followed by Bangladesh both in terms of research areas and the number of research affiliations with mHealth services. It was also apparent that many authors have been affiliated with Chinese universities in a number of instances. Furthermore, there were no dominating institutions publishing mHealth related articles. It was also noticeable that majority articles were published in the year of 2015. Our assessment of publication statistics shows that the number of integrated model related publication rather than a single model has generally increased year upon year since 2010. Results of our keyword analysis suggested that the extended TAM model has been primarily used for mHealth adoption research. TAM was discussed most frequently in terms of the 8 contributing theories / models alongside the UTAUT model.

In terms of methodological aspects, maximum studies were conducted by cross-sectional in nature or survey dominance. For statistical analysis aspects, our results found that Smart PLS 2.0 & 3.0, AMOS, Regression analysis, SEM, CFA, FA have been employed to test the validity of the model. Among these analytical tools, PLS-SEM appears to be the most favored for conducting the analysis while AMOS and LISREL have been used on a number of occasions. From our study, it was revealed that perceived usefulness and perceived ease of use of the technology were seen as two of the most significant factors regarding the adoption of mHealth in the included publication which is consistent with (Gagnon, Ngangue, Payne-Gagnon, & Desmartis, 2016). But they led this systematic review of mHealth adoption on professional perspectives. All of the included reviews demonstrated that numerous factors were crucial for the intention to adopt mHealth, and no single factor was recognized as a significant factor. In our study, it was observed that there were some factors that were negatively associated with mHealth adoption intention.

The most influential factors found in this study are in agreement with the result of previous studies on the application of UTAUT, TAM, Extended and UTAUT2 model in mHealth adoption. It was noticeable in our study that the name of the dependent variables is diverse such as behavioral intention, adoption intention, intention to use, attitude, actual use, use behavior and actual usage behavior. Amongst this dependent variable, behavioral intention was found as the most usable variable followed by adoption intention. It was also noticeable that the majority study emphasized on the general people as the target population followed by elderly people. Furthermore, subjective norm was another key factor influencing the adoption of mHealth services. In comparing the findings of our study with Chiarini et al. (2013) and Ross, Stevenson, Lau, and Murray (2016), Our findings focused on the factors affecting the adoption of mHealth which is a subset of eHealth. Research in the health information domain is not a completely new field, but in this study we reinforce a need for substantial exploration and improvement in various emerging sub-fields of the health informatics field, that may provide an insight which motivates researchers and practitioners in the field, by suggesting new research areas on innovative health systems, and their users and the context of their use. We consider that there is a need for more theoretical and applied research to contribute to the maturity of the health informatics field, which is a significant subset of information systems research.

Conclusions

There has been insufficient exploration with respects to the mHealth adoption. The present research is therefore aimed at enriching the existing literature of such research. In this research, top categories journals and conference papers were reviewed to find out the research on the critical variables influencing mHealth adoption. It is revealed that in a distinct context and user groups, there are many journals and conferences publishing mHealth / eHealth adoption research, with contributors from many areas, although

the majority are unsurprising from the view of developing nations. Now, the key factors affecting the efficient implementation of mHealth services have been identified, we are focused on empirical assessment of the suggested model with health customers to achieve a credible model that reflects variables that substantially influence the intentions of customers to leverage the use of mHealth. The results of this systematic review provide a common ground, enabling the most important factors behind mHealth services to be better understood. Of the ninety-four variables identified, fifteen were recognized as important factors affecting the intention to adopt mHealth. The results of this research could be helpful for mHealth developers, professionals and policy makers to further assist them build more efficient health care delivery system. It will enable them to better comprehend the factors affecting health consumers ' intentions to use mHealth effectively for their self-care. Moreover, the systematic review enables professionals and managers to develop credible proof based on collective ideas through theoretical synthesis.

Although this research presented an exhaustive synthesis of present information on mHealth adoption factors, there are some constraints to this review. First, the conceptual framework for the classification of factors recognized as facilitators for mHealth adoption from the research included in this review, was a generic grid of adoption factors. We recognized that using other theoretical frameworks/models might have revealed other dimensions of mHealth adoption. Furthermore, it does not include commercial mHealth alternatives created in latest years but not reported or quoted in any publication. Second, this review only looked at the data submitted in published research and there were no further contacts with the authors to obtain extra information or confirm our classification. Therefore, other reasons for acceptance of mHealth might have been missed. In addition, the systematic review method itself has the constraints that it depended strongly on the keywords selected. Third, although the study found the need for efficient assessment studies, the criticism of the methodologies of the studies included in this review was not delimited. Finally, only literature searches were performed in Eight bibliographic databases, but to recognize other possibly appropriate publications, we thoroughly verified references of included research and articles mentioning those studies. Future researchers may concentrate on overcoming the study's limitations.

References

Alalwan, A., Baabdullah, A. M., Rana, N. P., Dwivedi, Y. K., Hudaib, F., & Shammout, A. (2018). Examining the Factors Affecting Behavioural Intention to Adopt Mobile Health in Jordan. *11195*, 459-467. doi: 10.1007/978-3-030-02131-3_41

Alam, M. Z., Hu, W., & Barua, Z. (2018). Using the UTAUT Model to Determine Factors Affecting Acceptance and Use of Mobile Health (mHealth) Services in Bangladesh. *Journal of Studies in Social Sciences, 17*(2).

Alloghani, M., Hussain, A., Al-Jumeily, D., & Abuelma'atti, O. (2015). Technology Acceptance Model for the Use of M-Health Services among Health Related Users in UAE. 213-217. doi: 10.1109/DeSE.2015.58

Ashraf, M. M., Hasan, N., Lewis, L., Hasan, M. R., & Ray, P. (2017). A Systematic Literature Review of the Application of Information Communication Technology for Visually Impaired People. *International Journal of Disability Management Research, 11*, -.

Basak, E., Gumussoy, C. A., & Calisir, F. (2015). Examining the factors affecting PDA acceptance among physicians: an extended technology acceptance model. *Journal of healthcare engineering, 6*(3), 399-418.

Birko, S., Dove, E. S., & V, Ö. (2015). A Delphi Technology Foresight Study: Mapping Social Construction of Scientific Evidence on Metagenomics Tests for Water Safety. *PloS one, 10*(6), e0129706.

Bjornland, D., Goh, E., Haanæs, K., Kainu, T., & Kennedy, S. (2012). The Socio-economic impact of mobile health. *The Boston Consulting Group*.

Brown III, W., Yen, P.-Y., Rojas, M., & Schnall, R. (2013). Assessment of the Health IT Usability Evaluation Model (Health-ITUEM) for evaluating mobile health (mHealth) technology. *Journal of biomedical informatics, 46*(6), 1080-1087.

Chandwani, R., De, R., & Dwivedi, Y. K. (2018). Telemedicine for low resource settings: Exploring the generative mechanisms. *Technological Forecasting and Social Change, 127*, 177-187.

Chen, X., & Zhang, X. (2016). How Environmental Uncertainty Moderates the Effect of Relative Advantage and Perceived Credibility on the Adoption of Mobile Health Services by Chinese Organizations in the Big Data Era. *Int J Telemed Appl, 2016*, 3618402. doi: 10.1155/2016/3618402

Chiarini, G., Ray, P., Akter, S., Masella, C., & Ganz, A. (2013). mHealth technologies for chronic diseases and elders: a systematic review. *IEEE Journal on Selected Areas in Communications, 31*(9), 6-18.

Cho, J., Quinlan, M. M., Park, D., & Noh, G. Y. . (2014). Determinants of adoption of smartphone health apps among college students. . *American journal of health behavior,, 38*(6), 860-870.

Cocosila, M. (2013). Role of user a priori attitude in the acceptance of mobile health: an empirical investigation. *Electronic Markets, 23*(1), 15-27.

Deng, Z., Hong, Z., Ren, C., Zhang, W., & Xiang, F. (2018). What Predicts Patients' Adoption Intention Toward mHealth Services in China: Empirical Study. *JMIR Mhealth Uhealth, 6*(8), e172. doi: 10.2196/mhealth.9316

Deng, Z., Mo, X., & Liu, S. (2014). Comparison of the middle-aged and older users' adoption of mobile health services in China.

International Journal of Medical Informatics, 83(3), 210-224.

Dieste, O., Grimán, A., & Juristo, N. (2009). Developing search strategies for detecting relevant experiments. *Empirical Software Engineering, 14*(5), 513-539.

Dwivedi, Y. K., Kapoor, K. K., Williams, M. D., & Williams, J. (2013). RFID systems in libraries: An empirical examination of factors affecting system use and user satisfaction. *International Journal of Information Management, 33*(2), 367-377.

Dwivedi, Y. K., Rana, N. P., Janssen, M., Lal, B., Williams, M. D., & Clement, M. (2017). An empirical validation of a unified model of electronic government adoption (UMEGA). *Government Information Quarterly, 34*(2), 211-230.

Dwivedi, Y. K., Shareef, M. A., Simintiras, A. C., Lal, B., & Weerakkody, V. (2016). A generalised adoption model for services: A cross-country comparison of mobile health (m-health). *Government Information Quarterly, 33*(1), 174-187. doi: 10.1016/j.giq.2015.06.003

El-Wajeeh, M., Galal-Edeen, G., & Mokhtar, H. (2014). Technology acceptance model for mobile health systems. *IOSR Journal of Mobile Computing and Acceptance, 1*(1), 21-33.

Esposito, M., Minutolo, A., Megna, R., Forastiere, M., Magliulo, M., & De Pietro, G. (2018). A smart mobile, self-configuring, context-aware architecture for personal health monitoring. *Engineering Applications of Artificial Intelligence, 67*, 136-156.

Faqih, K. M. S., & Jaradat, M.-I. R. (2015). Mobile Healthcare Adoption among Patients in a Developing Country Environment: Exploring the Influence of Age and Gender Differences. *International Business Research, 8*(9). doi: 10.5539/ibr.v8n9p142

Free, C., Phillips, G., Felix, L., Galli, L., Patel, V., & Edwards, P. (2010). The effectiveness of M-health technologies for improving health and health services: a systematic review protocol. *BMC research notes, 3*(1), 250.

Gagnon, M. P., Ngangue, P., Payne-Gagnon, J., & Desmartis, M. (2016). m-Health adoption by healthcare professionals: a systematic review. *J Am Med Inform Assoc, 23*(1), 212-220. doi: 10.1093/jamia/ocv052

Greenspun, H., & Coughlin, S. (2012). mHealth in an mWorld: How mobile technology is transforming health care. *Deloitte Center for Health Solutions*.

Guo, X.-t., Yuan, J.-q., Cao, X.-f., & Chen, X.-d. (2012). *Understanding the acceptance of mobile health services: A service participants analysis.* Paper presented at the 2012 International Conference on Management Science & Engineering 19th Annual Conference Proceedings.

Guo, X., Han, X., Zhang, X., Dang, Y., & Chen, C. (2015). Investigating m-Health Acceptance from a Protection Motivation Theory Perspective: Gender and Age Differences. *Telemed J E Health, 21*(8), 661-669. doi: 10.1089/tmj.2014.0166

Guo, X., Sun, Y., Wang, N., Peng, Z., & Yan, Z. (2012). The dark side of elderly acceptance of preventive mobile health services in China. *Electronic Markets, 23*(1), 49-61. doi: 10.1007/s12525-012-0112-4

Guo, X., Sun, Y., Yan, Z., & Wang, N. (2012). *Privacy-Personalization Paradox in Adoption of Mobile Health Service: The Mediating Role of Trust.* Paper presented at the PACIS.

Guo, X., Zhang, X., & Sun, Y. (2016). The privacy–personalization paradox in mHealth services acceptance of different age groups. *Electronic Commerce Research and Applications, 16*, 55-65. doi: 10.1016/j.elerap.2015.11.001

Hoque, M. R. (2016). An empirical study of mHealth adoption in a developing country: the moderating effect of gender concern. *BMC Med Inform Decis Mak, 16*, 51. doi: 10.1186/s12911-016-0289-0

Hoque, M. R., Karim, M. R., & Amin, M. B. (2015). Factors affecting the adoption of mHealth services among young citizen: A Structural Equation Modeling (SEM) approach. *Asian Business Review, 5*(2), 60-65.

Hoque, M. R., Mazmum, M. F. A., & Bao, Y. (2014). e-Health in Bangladesh: current status, challenges, and future direction. *The International Technology Management Review, 4*(2), 87-96.

Hoque, R., & Sorwar, G. (2017). Understanding factors influencing the adoption of mHealth by the elderly: An extension of the UTAUT model. *Int J Med Inform, 101*, 75-84. doi: 10.1016/j.ijmedinf.2017.02.002

Hsiao, C.-H., Chen, M.-C., & Tang, K.-Y. (2013). *Investigating the Success Factors for the Acceptance of Mobile Healthcare Technology.* Paper presented at the PACIS.

Hung, M. C., & Jen, W. Y. (2012). The adoption of mobile health management services: an empirical study. *J Med Syst, 36*(3), 1381-1388. doi: 10.1007/s10916-010-9600-2

Jen, W. Y., & Hung, M. C. (2010). An empirical study of adopting mobile healthcare service: the family's perspective on the healthcare needs of their elderly members. *Telemed J E Health, 16*(1), 41-48.

Kalem, G., & Turhan, Ç. (2015). Mobile technology applications in the healthcare industry for disease management and wellness. *Procedia-Social and Behavioral Sciences, 195*, 2014-2018.

Källander, K., Tibenderana, J. K., Akpogheneta, O. J., Strachan, D. L., Hill, Z., ten Asbroek, A. H., . . . Meek, S. R. (2013). Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low-and middle-income countries: a review. *Journal of medical Internet research, 15*(1), e17.

Kenny, G., O'Connor, Y., Eze, E., Ndibuagu, E., & Heavin, C. (2017). A Ground-Up Approach to mHealth in Nigeria: A Study of Primary Healthcare Workers' Attitude to mHealth Adoption. *Procedia computer science, 121*, 809-816.

Khatun, F., Heywood, A. E., Ray, P. K., Hanifi, S. M., Bhuiya, A., & Liaw, S. T. (2015). Determinants of readiness to adopt

mHealth in a rural community of Bangladesh. *Int J Med Inform, 84*(10), 847-856. doi: 10.1016/j.ijmedinf.2015.06.008

Kitchenham, B. (2004). Procedures for performing systematic reviews. *Keele, UK, Keele University, 33*(2004), 1-26.

Kitchenham, B., Brereton, O. P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering–a systematic literature review. *Information and Software Technology, 51*(1), 7-15.

Krishna, S., Boren, S. A., & Balas, E. A. (2009). Healthcare via cell phones: a systematic review. *Telemedicine and e-Health, 15*(3), 231-240.

Laurenza, E., Quintano, M., Schiavone, F., & Vrontis, D. (2018). The effect of digital technologies adoption in healthcare industry: a case based analysis. *Business process management journal, 24*(5), 1124-1144.

Lee, E., & Han, S. (2015). Determinants of adoption of mobile health services. *Online Information Review, 39*(4), 556-573.

Lee, S.-J., Choi, M. J., Rho, M. J., Kim, D.-J., & Choi, I. Y. (2019). Factors Affecting User Acceptance in Overuse of Smartphones in Mobile Health Services: An Empirical Study Testing a Modified Integrated Model in South Korea. *Frontiers in Psychiatry, 10*, 259.

Leslie, I., Sherrington, S., Dicks, D., Gray, N., & Chang, T.-T. (2011). Mobile communications for medical care: a study of current and future healthcare and health promotion applications, and their use in China and elsewhere (final report, April 2011): Cambridge, University of Cambridge and China Mobile (http://www. csap. cam ….

Lim, S., Xue, L., Yen, C. C., Chang, L., Chan, H. C., Tai, B. C., Choolani, M. (2011). A study on Singaporean women's acceptance of using mobile phones to seek health information. *Int J Med Inform, 80*(12), e189-202. doi: 10.1016/j.ijmedinf.2011.08.007

Liu, F., Ngai, E., & Ju, X. (2019). Understanding mobile health service use: An investigation of routine and emergency use intentions. *International Journal of Information Management, 45*, 107-117. doi: 10.1016/j.ijinfomgt.2018.09.004

Lv, X., Guo, X., Xu, Y., Yuan, J., & Yu, X. (2012). Explaining the Mobile Health Services Acceptance from Different Age Groups: A Protection Motivation Theory Perspective. *International Journal of Advancements in Computing Technology, 4*(3), 1-9. doi: 10.4156/ijact.vol4.issue3.1

Maiga, G., & Namagembe, F. (2014). *Predicting adoption of mHealth technology in resource constrained environments.* Paper presented at the 2014 IST-Africa Conference Proceedings.

Mechael, P., Batavia, H., Kaonga, N., Searle, S., Kwan, A., Goldberger, A., Ossman, J. (2010). *Barriers and gaps affecting mHealth in low and middle income countries: Policy white paper*: Columbia university. Earth institute. Center for global health and economic ….

Meng, F., Guo, X., Peng, Z., Lai, K. H., & Zhao, X. (2019). Investigating the Adoption of Mobile Health Services by Elderly Users: Trust Transfer Model and Survey Study. *JMIR Mhealth Uhealth, 7*(1), e12269. doi: 10.2196/12269

Miah, S. J., Gammack, J., & Hasan, N. (2017). Extending the framework for mobile health information systems Research: A content analysis. *Information Systems, 69*, S0306437917301631.

Miao, R., Wu, Q., Wang, Z., Zhang, X., Song, Y., Zhang, H., Jiang, Z. (2017). Factors that influence users' adoption intention of mobile health: a structural equation modeling approach. *International Journal of Production Research, 55*(19), 5801-5815. doi: 10.1080/00207543.2017.1336681

Munyua, S., Rotich, G., & Kimwele, M. (2015). Factors affecting the adoption of mhealth in maternal health care in nakuru provincial general hospital. *Int J Sci Technol Res, 2015*, 4.

Ndayizigamiye, P., & Maharaj, M. (2016). *Mobile health adoption in Burundi: A UTAUT perspective.* Paper presented at the 2016 IEEE Global Humanitarian Technology Conference (GHTC).

Ndayizigamiye, P., & Maharaj, M. (2017). Determinants of Mobile Health Adoption in Burundi. *The African Journal of Information Systems, 9*(3), 4.

Okazaki, S., Blas, S. S., & Castañeda, J. A. (2015). Physıcıans'adoptıon Of Mobıle Health Monıtorıng Systems In Spaın: Competıng Models And Impact Of Prıor Experıence. *Journal of Electronic Commerce Research, 16*(3), 194.

Okazaki, S., Castaneda, J. A., Sanz, S., & Henseler, J. (2012). Factors affecting mobile diabetes monitoring adoption among physicians: questionnaire study and path model. *J Med Internet Res, 14*(6), e183. doi: 10.2196/jmir.2159

PWC, G. (2012). Touching lives through mobile health: Assessment of the global market opportunity.

Quaosar, G., Hoque, M. R., & Bao, Y. (2018). Investigating Factors Affecting Elderly's Intention to Use m-Health Services: An Empirical Study. *Telemed J E Health, 24*(4), 309-314. doi: 10.1089/tmj.2017.0111

Rai, A., Chen, L., Pye, J., & Baird, A. (2013). Understanding determinants of consumer mobile health usage intentions, assimilation, and channel preferences. *J Med Internet Res, 15*(8), e149. doi: 10.2196/jmir.2635

Ross, J., Stevenson, F., Lau, R., & Murray, E. (2016). Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). *Implementation Science, 11*(1), 146.

Sadegh, S. S., Saadat, P. K., Sepehri, M. M., & Assadi, V. (2018). A framework for m-health service development and success evaluation. *International Journal of Medical Informatics, 112*, 123-130.

Saunders, M. N. (2011). *Research methods for business students, 5/e*: Pearson Education India.

Schwarz, A., & Chin, W. (2007). Looking forward: Toward an understanding of the nature and definition of IT acceptance. *Journal of the association for information systems, 8*(4), 4.

Seuring, S., Müller, M., Westhaus, M., & Morana, R. (2005). Conducting a literature review—the example of sustainability in supply chains *Research methodologies in supply chain management* (pp. 91-106): Springer.

Shareef, M. A., Kumar, V., & Kumar, U. (2014). Predicting mobile health adoption behaviour: A demand side perspective. *Journal of Customer Behaviour, 13*(3), 187-205.

Sharifi, M., Ayat, M., Jahanbakhsh, M., Tavakoli, N., Mokhtari, H., & Wan Ismail, W. K. (2013). E-health implementation challenges in Iranian medical centers: a qualitative study in Iran. *Telemedicine and e-Health, 19*(2), 122-128.

Srisawangwong, P., & Kasemvilas, S. (2014). *Mobile persuasive technology: a review on thai elders health service opportunity.* Paper presented at the 2014 14th International Symposium on Communications and Information Technologies (ISCIT).

Steinhubl, S. R., Muse, E. D., & Topol, E. J. (2015). The emerging field of mobile health. *Science translational medicine, 7*(283), 283rv283-283rv283.

Sun, N., & Rau, P.-L. P. (2015). The acceptance of personal health devices among patients with chronic conditions. *International Journal of Medical Informatics, 84*(4), 288-297. doi: 10.1016/j.ijmedinf.2015.01.002

Sun, Y., Wang, N., Guo, X., & Peng, Z. (2013). Understanding the acceptance of mobile health services: a comparison and integration of alternative models. *Journal of electronic commerce research, 14*(2), 183.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management, 14*(3), 207-222.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Waegemann, C. P. (2010). mHealth: the next generation of telemedicine? *Telemedicine and e-Health, 16*(1), 23-26.

Wang, L., Wu, T., Guo, X., Zhang, X., Li, Y., & Wang, W. (2018). Exploring mHealth monitoring service acceptance from a service characteristics perspective. *Electronic Commerce Research and Applications, 30*, 159-168. doi: 10.1016/j.elerap.2018.06.003

Williams, M. D., Dwivedi, Y. K., Lal, B., & Schwarz, A. (2009). Contemporary trends and issues in IT adoption and diffusion research. *Journal of Information Technology, 24*(1), 1-10.

Wu, I.-L., Li, J.-Y., & Fu, C.-Y. (2011). The adoption of mobile healthcare by hospital's professionals: An integrative perspective. *Decision Support Systems, 51*(3), 587-596. doi: 10.1016/j.dss.2011.03.003

Yusof, A. F., & Iahad, N. (2012). *Review on online and mobile weight loss management system for overcoming obesity.* Paper presented at the 2012 International Conference on Computer & Information Science (ICCIS).

Zhang, X., Guo, X., Guo, F., & Lai, K.-H. (2014). Nonlinearities in personalization-privacy paradox in mHealth adoption: the mediating role of perceived usefulness and attitude. *Technology and Health Care, 22*(4), 515-529.

Zhang, X., Guo, X., Lai, K.-h., Guo, F., & Li, C. (2014). Understanding gender differences in m-health adoption: a modified theory of reasoned action model. *Telemedicine and e-Health, 20*(1), 39-46.

Zhang, X., Han, X., Dang, Y., Meng, F., Guo, X., & Lin, J. (2017). User acceptance of mobile health services from users' perspectives: The role of self-efficacy and response-efficacy in technology acceptance. *Inform Health Soc Care, 42*(2), 194-206. doi: 10.1080/17538157.2016.1200053

Zhao, Y., Ni, Q., & Zhou, R. (2018). What factors influence the mobile health service adoption? A meta-analysis and the moderating role of age. *International Journal of Information Management, 43*, 342-350.

Zhu, Z., Liu, Y., Che, X., & Chen, X. (2018). Moderating factors influencing adoption of a mobile chronic disease management system in China. *Inform Health Soc Care, 43*(1), 22-41. doi: 10.1080/17538157.2016.1255631

Appendix A: Review of factors affecting the adoption of mHealth

Author	Country	IV	DV	Target population	Sample Size	Model/ Theories	Key Significant and Insignificant Factors
(R. Hoque & Sorwar, 2017)	Bangladesh	- Performance Expectancy - Effort Expectancy - Facilitating conditions - Social influence	- Behavioral Intention, -Use Behavior	Elderly Persons	274	Extended UTAUT	Significant: Performance expectancy, effort expectancy, social influence, technology anxiety, and resistance to change.
(Quaosar, Hoque, & Bao, 2018)	Bangladesh	- Performance Expectancy - Effort Expectancy - Facilitating condition	- Behavioral Intention -Use Behavior	Elderly Persons	245	Extended UTAUT	Significant: Performance expectancy, effort expectancy, social influence, and perceived credibility. Insignificant:
(M. R. Hoque, 2016)	Bangladesh	-Perceived Usefulness -Perceived Ease of Use -Subjective Norm	-Intention to Use -Actual Use	Young Citizens	227	Extended TAM	Significant: Perceived ease of use, perceived usefulness, and subjective norm. Insignificant: Personal
(Md Rakibul Hoque, Karim, & Amin, 2015)	Bangladesh	- Perceived Usefulness - Perceived Ease of	-Intention to Use -Actual	Young Citizens	137	TAM	Significant: Perceived Usefulness Insignificant: Perceived ease of use
(Shareef, Kumar, & Kumar, 2014)	Bangladesh	-Perceived usefulness, -Perceived ease of use, -Perceived reliability, -Perceived	-Adoption of m-health	General Population	326	Extended TAM	Significant: Perceived usefulness, perceived ease of use, perceived reliability, and perceived security and privacy. Insignificant: Perceived compatibility
(Khatun et al., 2015)	Bangladesh	-Technological readiness -Motivational readiness	-mHealth Readiness	Rural People	4915	Integrated	Significant: Technological readiness, Human resource readiness, and
(Alam, Hu, & Barua, 2018)	Bangladesh	-Performance Expectancy -Effort Expectancy -Social Influence -Facilitating Conditions -Price value -Perceived	- Behavioral Intention -Actual usage Behavior	General Population	296	Extended UTAUT	Significant: Performance expectancy, effort expectancy, social influence, facilitating condition & perceived reliability Insignificant: Price value
(Zhaohua Deng, Mo, & Liu, 2014)	China	- Perceived value - Attitude - Perceived behavior control - Subject norm - Perceived physical condition - Resistance to change - Technology anxiety	- Behavioral Intention	Middle-aged persons & Older Adults	424	Integrated	Significant: Perceived value, attitude, perceived behavior control, and resistance to change for middle-aged and perceived value, attitude, perceived behavior control, technology anxiety, and self-actualization for older adults
(Xitong Guo, Zhang, & Sun, 2016)	China	-Perceived personalization -Privacy concerns -Trust	-Behavior Intention	General Population	650	-Integrated	Significant: Perceived personalization and privacy concerns, trust.

(Xiaofei Zhang, Guo, Lai, Guo, & Li, 2014)	China	-Attitude toward the behavior -Facilitating conditions -Subjective norm	-Adoption intention	General Population	481	Extended TRA	Significant: Facilitating conditions, attitude, and subjective norms.
(Zhao et al., 2018)	China	-Perceived usefulness, -Perceived ease of use, -Perceived vulnerability -Perceived severity -Perceived behavioral; control, -Subjective norm,	-Attitude - Behavioral Intention	General Population	Meta-Analysis	Meta-Analysis	Significant: Perceived usefulness, perceived ease of use, perceived vulnerability and perceived severity for individual attitude whereas Perceived usefulness, perceived ease of use, subjective norm, trust, perceived
(Xiaofei Zhang, Guo, Guo, & Lai, 2014)	China	-Privacy Concerns -Personalization -Mediating Variables -Attitude -Perceived Usefulness -Perceived ease of	-Adoption intention	General Population	489	Integrated	Significant: Personalization and privacy for perceived usefulness via attitude.
(Z. Deng, Hong, Ren, Zhang, & Xiang, 2018)	China	-Perceived usefulness, -Perceived ease of use -Perceived Risk -Privacy Risk -Performance Risk -Legal Concern	-Trust -Adoption Intention	All Patients and caregivers	388	Extended TAM	Significant: Trust, perceived usefulness, and perceived ease of use, Privacy and performance risks.
(Miao et al., 2017)	China	-Perceived ease of use -Perceived usefulness -Technology fear -Subjective norm -Network Effect -Existing degree of	-Adoption Intention	All Patients	519	Extended TAM	Significant: Perceived usefulness, perceived ease of use, subjective norm, satisfaction, network effect, and cost factor.
(Lv, Guo, Xu, Yuan, & Yu, 2012)	China	-Perceived Vulnerability -Perceived Severity -Response Efficacy -Self Efficacy -Response Cost	-Intention	General Population	492	Protection Motivation Theory (PMT)	Significant: Response efficacy and self-efficacy for young adults and middle age people and self-efficacy for the elderly Insignificant: Response cost, Perceived
(Xitong Guo, Sun, Wang, Peng, & Yan, 2012)	China	-Perceived usefulness -Perceived ease of use -Resistance to change -Technology anxiety	-Adoption intention	Elderly Persons	204	Dual Factor	Significant: Resistance to change, perceived usefulness, Technology anxiety and Dispositional resistance to change Insignificant: Perceived
(Chen & Zhang, 2016)	China	- Relative advantage - Perceived credibility - Environmental	-Adoption Intention	Organizations	320	Integrated	Significant: Relative advantages and perceived credibility and Environmental

(X.-t. Guo, Yuan, Cao, & Chen, 2012)	China	-Perceived ease of use -Perceived usefulness -Social norms -Outcome quality	Adoption Intention	General Population	492	Extended TAM	Significant: Perceived ease of use, perceived usefulness, Outcome quality, Social norms.
(Y. Sun, Wang, Guo, & Peng, 2013)	China	-Perceived Usefulness -Perceived Ease of Use -Attitude -Subjective Norm -Perceived Behavioral Control -Perceived Vulnerability -Perceived Severity -Response Efficacy -Response Cost -Self-efficacy	Adoption Intention	Elderly Persons	212	Integrated	Significant: Perceived usefulness, Perceived Ease of Use, attitude, subjective norms, perceived behavioral control, perceived vulnerability, response efficacy response cost, self-efficacy. Insignificant: Perceived severity.
(Wang et al., 2018)	China	-mHealth service matching -mHealth service competence - Affective attitude - Cognitive attitude	Use Intention	General Population	217	Integrated	Significant: mHealth service matching, mHealth service competence, cognitive and affective attitudes.
(N. Sun & Rau, 2015)	China	-Attitude toward technology -Perceived usefulness -Ease of learning and availability -Social norm -Perceived Pressure -Perceived Usefulness	-Adoption Intention	General Population	346	Integrated	Significant: Attitude toward technology, ease of learning and social norm. Insignificant: Perceived Pressure, Perceived Usefulness
(Xitong Guo, Sun, Yan, & Wang, 2012)	China	- Privacy concern - Personalization concern -Trust	- Adoption Intention	All Professionals	492	Integrated	Significant: Trust and Personalization concern Insignificant: Privacy concern.
(Liu, Ngai, & Ju, 2019)	China	-Perceived usefulness - Perceived enjoyment	- Emergency use intention - Routine use	Community people	241	Extended Motivation Theory	Significant: Perceived usefulness and perceived enjoyment.
(X. Guo, Han, Zhang, Dang, & Chen, 2015)	China	-Perceived vulnerability -Perceived severity -Response efficacy -Self-efficacy	-Attitude -Intention to use	General Population	428	PMT	Significant: Perceived vulnerability, perceived severity, response efficacy, self-efficacy
(Meng, Guo, Peng, Lai, & Zhao, 2019)	China	-Trust in offline health services -Trust in mHealth services -Support from hospitals -Perceived risk	- Behavioral Intention	Elderly Persons	395	Trust Transfer Model	Significant: Trust in mHealth, trust in offline, declining psychological conditions. Insignificant: Support from hospitals
(X. Zhang et al., 2017)	China	-Perceived usefulness -Perceived ease of use -Self-efficacy -Social influence	-Adoption intention	General Population	600	Integrated	Significant: Perceived usefulness, self-efficacy, response efficacy and perceived ease of use.

(Zhu, Liu, Che, & Chen, 2018)	China	-Perceived usefulness -Perceived ease of use -Perceived disease threat -Perceived risk -Initial trust	-Adoption intention	General Population	279	Integrated	Significant: Perceived usefulness, perceived ease of use, perceived disease threat, perceived risk, and initial trust Insignificant: Technology anxiety
(Hung & Jen, 2012)	Taiwan	-Perceived usefulness -Perceived ease of use	- Attitude - Behavioral Intention	General Population	170	TAM	Significant: Perceived usefulness, Perceived ease of use and attitude.
(Wu, Li, & Fu, 2011)	Taiwan	-Perceived usefulness -Perceived ease of use - Personal Innovativeness in IT - Perceived behavioral control	- Attitude - Behavioral Intention	Healthcare Professionals	80	Integrated	Significant: Perceived usefulness, perceived behavioral control, subjective norm, personal innovativeness in IT, perceived service availability. Insignificant: Perceived
(Hsiao, Chen, & Tang, 2013)	Taiwan	-Perceived usefulness -Perceived ease of use -Perceived ubiquity -Health knowledge -Health care need -Attitude	- Behavioral Intention	Elderly Persons	338	Integrated	Significant: Perceived ease of use, perceived ubiquity, health knowledge, health care need, attitude, social norm. Insignificant: Perceived
(Jen & Hung, 2010)	Taiwan	-Perceived usefulness -Perceived ease of use -Subjective norms -Perceived behavioral control	- Behavioral Intention	Middle-aged persons	100	Extended TAM	Significant: Perceived usefulness, perceived ease of use and attitudes. Insignificant: Subjective norms and Perceived Behavioral Control.
(Faqih & Jaradat, 2015)	Jordan	-Social Influence -Trust -Security/Privacy -Cost -Perceived Usefulness -Perceived ease of Use	- Behavioral Intention	All Patients	366	Extended TAM	Significant: Perceived ease of use, perceived usefulness, social influence, trust, and security/privacy.
(Alalwan et al., 2018)	Jordan	-Perceived usefulness -Social influence -Innovativeness -Awareness	- Behavioral Intention	General Population	365	Integrated	Significant: Perceived usefulness, social influence, and innovativeness.
(E. Lee & Han, 2015)	South Korea	- Usefulness Value - Convenience value - Monetary value - Perceived needs	-Adoption Intention	General Population	550	Integrated	Significant: Usefulness, convenience, and monetary values.
(S.-J. Lee, Choi, Rho, Kim, & Choi, 2019)	South Korea	-Perceived Usefulness -Perceived Ease of Use -Perceived security -Resistance to	Behavioral Intention	General Population	400	Integrated	Significant: Perceived usefulness, perceived ease of use, resistance to change and social norms. Insignificant: Perceived security

(Ndayizigamiye & Maharaj, 2016)	Burundi	-Performance Expectancy -Effort Expectancy -Social Influence -Facilitating Conditions	-Adoption Intention	Healthcare Professionals	212	UTAUT	Significant: Performance expectancy, effort expectancy and facilitating conditions are significantly correlated with mHealth
(Ndayizigamiye & Maharaj, 2017)	Burundi	-Relative advantage -Complexity -Compatibility -Trialability -Observability	-Adoption intention	Healthcare Professionals	212	Integrated	Significant: Relative advantage, compatibility, trialability and observability Insignificant: Complexity
(Munyua, Rotich, & Kimwele, 2015)	India	- Knowledge and awareness -Government policies, - Access to mobile technology, -ICT infrastructure	-Adoption Intention	All Patients & Medical Staff	121	Integrated	Significant: Knowledge and awareness, government policies, access to mobile technology, ICT infrastructure, cost.
(Shintaro Okazaki, Blas, & Castañeda, 2015)	Spain	-Subjective norm -Overall quality -Perceived value -Net benefits	-Usage intention	All Physicians	495	Extended D & M	Significant: Overall quality, net benefits, and perceived value.
(Rai, Chen, Pye, & Baird, 2013)	USA	-Personal innovativeness -Perceived health conditions -Health care availability and health care utilization	- Behavioral Intention	General Population	1132	Integrated	Significant: Consumers' PIMS and perceived health conditions.
(Alloghani, Hussain, Al-Jumeily, & Abuelma'atti, 2015)	UAE	-Perceived usefulness, -Perceived ease of use -Trust -Security	-Intention to use	All Patients	144	Extended TAM	Significant: Perceived usefulness, perceived ease of use, trust, and security.
(El-Wajeeh, Galal-Edeen, & Mokhtar, 2014)	Egypt, Yemen	-Perceived Usefulness -Perceived Ease to Use -Trust -Social Influence -Data Privacy -Perceived Value -Facilitating Conditions -Technology Anxiety -Resistance to Change	-Intention to Use	All Patients, health professionals, and general health users.	302	Extended TAM	Significant: Perceived usefulness, perceived ease of use, perceived value, portability, Self-efficacy, and technology anxiety, Trust, Social Influence, Facilitating Conditions. Insignificant: Resistance to Change
(Maiga & Namagembe, 2014)	Uganda	-Performance Expectancy -Effort Expectancy -Disturbance concerns -Personal Incentives -Social Influence -Facilitating	-Behavior Intention -Use Behavior	Healthcare Professionals	169	Extended UTAUT	Significant: Performance expectancy, effort expectancy, and disturbance concerns

(Kenny, O'Connor, Eze, Ndibuagu, & Heavin, 2017)	Nigeria	-Initial Perceived Relevance -Initial Perceived Benefits -Initial Perceived Threats -Initial	-Attitude towards adoption	Healthcare Workers	20	Integrated	Significant: Initially perceived relevance and initial perceived benefits Insignificant: Initially perceived threats and initial understanding
(Lim et al., 2011)	Singapore	-Perceived Usefulness -Perceived Ease of Use -Self-efficacy -Technological	-Behavioral Intention -Actual Use	All females	175	Extended TAM	Significant: Perceived usefulness, perceived ease of use and self-efficacy. Insignificant:
(Yogesh K. Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016)	USA, Canada, and Bangladesh	-Performance Expectancy - Effort Expectancy - Facilitating conditions - Social influence -Self-concept -Price Value -Waiting time -Hedonic motivation	-Behavioral Intention -Actual usage Behavior	Elderly persons	1121	Integrated	Significant: Performance expectancy, effort expectancy, facilitating conditions, social influence, price value, waiting time was significant for these three countries. Insignificant: Self-efficacy Hedonic
(Basak, Gumussoy, & Calisir, 2015)	Turkey	-Perceived usefulness -Perceived enjoyment -Perceived ease of use -Subjective norms -Personal	-Behavioral Intention	All Physicians	339	Extended TAM	Significant: Perceived usefulness, perceived ease of use, Subjective norms, Personal innovativeness, and computer self-efficacy. Insignificant: Perceived enjoyment
(Cocosila, 2013)	UK	-Overall perceived risk -Attitude toward activity -Extrinsic	-Behavioral Intention	Young citizens	170	Integrated	Significant: Overall perceived risk, extrinsic motivation, and intrinsic motivation and attitudes.
(S. Okazaki, Castaneda, Sanz, & Henseler, 2012)	Japan	-Overall service quality -Perceived value -Subjective norms -Privacy and security risk -Net benefits	Behavioral Intentions	All Physicians	471	Integrated	Significant: Perceived value, subjective norms, and net benefits.
(Gagnon et al., 2016)	All Countries	-Perceived usefulness -Perceived ease of use -Design and technical concerns, -Cost, -Time, -Privacy and security issues, -Familiarity with the technology,	-Adoption Intention	Healthcare Professionals	Meta-Analysis	Meta-Analysis	Significant: Perceived usefulness, Perceived ease of use, Design and technical concerns, Cost, time, privacy and security issues, Familiarity with the technology, Risk-benefit assessment, Interaction with others.