Mobile Health and Users Demographic Characteristics and Preferences. A case Study from the UAE

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Abstract

Diabetes mellitus is one of the widespread chronic diseases at the global level, but with different proportions. The United Arab Emirates UAE is one of the countries suffering from diabetes. In line with the support of the health sector on the one hand and raising the level of awareness for citizens on the other hand, Mobile Health has been adopted to provide and facilitate health services for citizens at the time and place appropriate for the patient. Despite the media momentum of Mobile Health, usage levels are still low. However, there is a demand for the use of health phones, especially in light of the Covid19. Therefore, this paper aims to determine the demographic and social factors of health phone users for the diabetes epidemic in the UAE. This paper also aims to identify effective factors to motivate users. The results of this study show that relatively more male and female employees are able to pay wages, whose ages range between 20 and 30. The study also shows the importance of the quality of health telephone services as one of the most important factors driving the use, especially in the quality of the system, interaction and information

INTRODUCTION

Internet is a global system of interconnected computer networks that support billions of users worldwide using the standard internet protocol set. For several reasons, the Internet has been becoming increasingly prominent not only in business marketing, online shopping and education, but almost every aspect of human life, including personal health management. It is a network consisting of millions of local, global private, public, academic, corporate and public networks connected by a wide range of technology for electronic, wireless and optical networking. This helps to not only achieve human tasks and facilitate their lives, but also change the way of thinking, managing and achieving the tasks efficiency and effectively. Therefore, the use of technology internet has been steadily increasing as shown in the Figure 1

Figure 1: Internet Usage Source: (Sustainable Development, 2019).
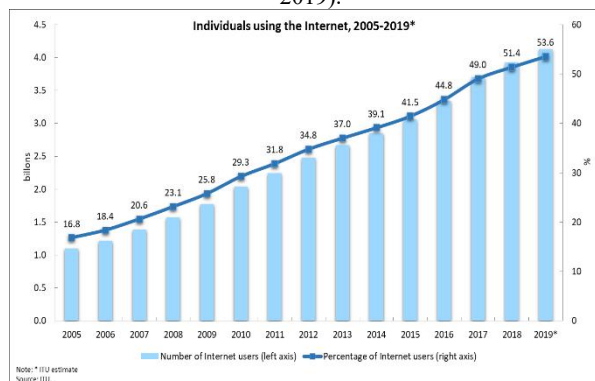
Smart phones have become the integral part of our everyday success with the increasing pace of technological advancement. People around the world today have a new dependency. This latest reliance is called the smartphone. Today 's smartphones have so much functionality that their owners can hardly seem to be only a second behind them. These smartphones deliver not only some of the same functions as a personal computer, but also high entertainment levels. Due to jobs, school and personal problems, people tend to live occupied in these days. Consequently, they prefer the use of a mobile device that meets their needs and is always accessible. Smartphone is one of the mobile devices that enables users to share and exchange information, for example, through the Internet or on mobile networks, text, document, images and videos. Smart telephones have given the term multitasking a whole new meaning. In advance, when you were in a food store picking up certain required products, it was impossible to keep in touch with colleagues at your office. Intelligent phones have allowed us to perform several tasks simultaneously. As a result of their mobile phone, smartphones are more comfortable to use than workstations or home phones. In addition, the communication between friends and family members is an effective and discreet way. Smartphone users therefore saw a growth from approximately 1.57 billion users in 2014 to approximately 2.87 billion in 2019, as Figure 2. demonstrates.

The unique combination of features enables the use and use of Smartphones for various purposes. Smartphones in the

Number of smartphone users worldwide from 2014 to 2020 (in billions)
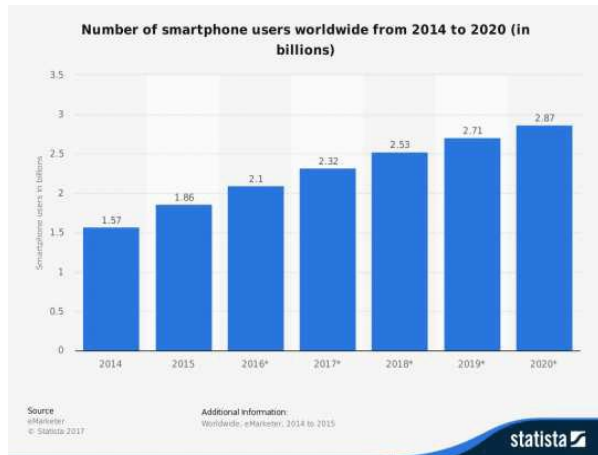
healthcare sector increase user capabilities and contribute to require to develop new and unique technological equipment due to the increasing speed of all decision-making procedures

Figure 2. Number of Smartphone Users Worldwide from 2014 to 2020 (in billions)

the early resolution of chronic health issues such as diabetes and obesity. This is why technological companies have been in health and life. Normally, "a smart phone is a single device combining the features of a mobile phone with the handheld computer. The operating system and local store are different for normal phones, so that udders can add and save data, send and receive e-mail and install telephone programs as possible using PDA Yuan. Also known as a cell phone may be a smartphone.

Mobile Health
Recently, mhealth has become one of the most innovative technology to solve problem of chronical diseases and disaster management. The total global size of the mHealth market in 2019 was estimated to be $40.7 billion. In the projected period, the CAGR is projected to be 29.2% (Grand View Research, 2020).In recent years, almost all industries, particularly health care, have been driven by digitalization. With the increasing penetration of smartphones and internet connectivity, medical practitioners and patients have significantly increased

Figure 3: mHealth Market Size Source (Grand View

U.S. mHealth market size, by services, 2016 - 2027 (USD Billion)
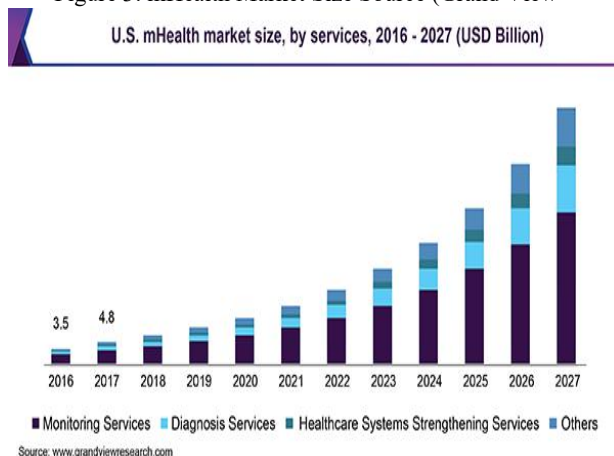
Research, 2020)

their use of mHealth technologies. This applies especially for mobile healthcare applications, including fitness and health care apps, with a large proportion of the entire mHealth apps

market in fitness and wellness. Digital healthcare, thanks to the US mobile-based health app providers, wearable devices and e-prescription systems, has been developing the industry (Grand View Research, 2020) as a driving force for the market. Moreover, because of supporting government initiatives in all areas, the healthcare industry has a high growth potential for the IT industry. The segment growth has significantly contributed to recent advances in wearable techniques and the increasing prevalence of chronic conditions, mostly cardiovascular disorders, diabetes and obesity.

Mobile Health in Middle Eastern Countries
This section is also divided into seven sections. The first section examines the different mHealth technology services in developing countries, particularly in the context of the Near East. The second section highlights definitions of the quality of service. Section 4 examines the conceptualization of the quality in mHealth services; Section 5 examines the dimensions in mHealth for service quality; Section six deals with the implications for service providers of service quality and Section seven, which is the final part, addresses the impact on consumers of service quality.

Arab countries, in particular in the Middle East region, including the United Arab Emirates (UAE), have experienced a significant amount of growth and huge changes in the health sector during the last few years. The people of the Arab world require their government to be accountable and to be included at all levels (Alsadan et al., 2015). The transition in mortality is the important indicator of progress in the health and public health services systems. This applies to developing countries, but not to developing countriesIn terms of demographic situation, developing countries were lagging behind in the transition. However, Arab countries have tried to disregard this concept by managing health services effectively and most Arab countries have lowered their mortality rate. (WHO, 2010). The use of IT was widespread in the present age of globalisation. Each country is trying to seize this development asset because it is virtually impossible to grow and compete with the contemporary world without up-to - date technologies and informatics. It is therefore called the ICT environment, where information needs to be exchanged among various sectors of the economy. (Jones, S., 2011).

Maintaining the information system and developing own knowledge sharing networks to hit a competitive advantage worldwide is the best way for most countries like India, China, Germany, the US or Russia to do it. These information systems are so powerful in the field of medicine in developed countries in Europe in particular, including Germany, France, the United Kingdom, Norway, Sweden and others that most hospitals are electronically related. (Erupean Comminssion, 2015) . While progress is not marked by success in developed countries , the government tries to provide incentives and encourage organizations to use information systems (Gambo, Oluwagbemi, & Achimugu, 2011). Governments in these developing countries wish to achieve their nation'

Table 2.1. Mobile Health Technology Services in Middle Eastern Countries

Author(S)	M-Health Service	Activity	Country
(Atallah, Khalifa, El Metwally, & Househ, 2018)	mobile phone applications currently cater to mental health patients and offer them a variety of applications related to monitoring, assessment, education, and treatment	Recommended use mhealth for mental through offering apps that allows the patients to freely	Palestine
(Sijbrandij et al., 2017)	STRENGTHS programme Problem Management Plus (PM+),	This project is intended to improve the responsiveness and the burden of disease among vulnerable populations, including Syrians affected by war and displacement, of the national and local medical care systems affected by the Syrian refugee crisis.	Used by Europe countries and WHO for Arabian refugee
(Alanzi, 2018)	Mobile health for diabetes Service provider, consumer (patient) and healthcare worker communication services	A Virtual Private Network (VPN) is provided to facilitate contact between healthcare providers and patients, and contact between telephone and text messages. Officials of healthcare.	Saudi Arabia
(Alnasser, Sathiaseelan, Al-Khalifa, & Marais, 2019)	Android and iPhone operating system platforms, is a user-friendly, interactive app designed to track daily physical activity and food intake, and then provides customized advice to losing weight.	Weight assessment and goal setting Health deity recommendation Physical activities Self-monitoring Social support to facilitate weight loss through diet and PA modification	UAE

competitive advantage through their investments in information technology programmers that benefit people by providing them with unique and convenient services. For example, in many countries in the Middle East the health application has recently adapted, as illustrated in Table 1. This technology has witnessed to play key role in health problem solving through facilitating the continuously interaction and monitoring with patients conveniently and effectively as well as efficiency. This results and improvement in both outreach the patients with large quantity and quality improvement as well. However, the application of Mobile health still in the infant stage and limited to very few types of services such as mental, Health deity and others as shown in Table 2.1. Yet even though, there are several diseases that are wide spreading in the Middle East region in general and the UAE particularly such as diabetes, the mobile health literature still lacks to sufficient studies. Therefore, this study aims to identify and describe the demographic factors of these who use mobile health in the UAE. In addition, this study aims to explore the effective factors that motivate users to continue use mhealth through addressing open question. The context of this research is in the UAE because it is the fastest growing medical tourism centre in the world, generally and in the UAE particularly (Gulf News Health, 2016). The sample was selected from the users' of mhealth who are suffering of obesity and diabetes and obesity. As reported by (GBD 2015 Obesity Collaborators, 2017) more than 10 percent of the world's population 107.7 million children and 603.7 adults is now obese. In the UAE context about 71 percent of Emirati population is currently obese and more likely will rise to about 81 % by 2019 most of them women about 77.8% compared to 70.8% men (Panthayil Babu Rajan, 2017). In contrast, as reported by the (Imperial College London Diabetes Centre, 2019) there are over 1 million people living with diabetes in the UAE, placing the country 15th worldwide for age-adjusted comparative prevalence. This research and other studies in the literature found that the Use of mobile health adds value to both health institutions

and the users. On one hand, the health institutions can improve their social mission in providing their services to a large quantity of people with a lower cost and convenient time. On the other and, the users' service can easily access to health services at lowest cost and in a convenient time. But, the proportion of these who use mobile health is very low, which forms a theoretical and practical gap to both researchers and industrial developers.

METHODOLOGY
Quantitative method was used through distribution survey to mobile health users who are suffering of diabetes. The data was collected for the present study by distributing a set 500 questionnaires (sample size) among the UAE patients who are suffering of diabetes and obesity located in Abu Dhabi in UAE during the month of February 2020. After three weeks, a total of 405 questionnaires were returned, thus determined the response rate of 79 percent. However, out of 405 questionnaires, twenty-eight were found incomplete and contained missing values of more than 10 percent thus excluded from the data analysis. Moreover, eleven questionnaires were determined as unengaged responses due to their standard deviation value of 0. Therefore, among 366 questionnaires, 45 were excluded because they were uncompleted and finally 321 were found valid for statistical

data analysis. The finalized data was not tested for normality checks as SmartPLS does not mandatorily consider research data to be normally distributed as a pre-requisite for statistical analysis (F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014).

RESULTS
Respondent's Background
Table 2 includes demographic information of the respondents such as gender, age group, and Your purpose for visiting the halal destination. Classification of respondents based on gender was 53 percent male and 47 percent were female. Respondents were young and belonged to the age group of Below 25 years old with about 44.9 percent, meanwhile the lowest were group age between 31- 40 with 8.7 percent.

Table 2. Respondent's Background

| Demographic Variables		Frequency	Valid (%)
Gender	Female	47%	151
	Male	53%	170
Age group	15-25	144	44.9
	26-30	122	38.0
	31-40	27	8.4
	> 40	28	8.7
level of education	Postgraduate	37	11.6
	Degree	158	49.2
	Secondary School	91	28.3
	Primary School	35	10.9
Do you have a job?	Yes	186	58
	No	24	42
How long did you use mHealth technology services	< 1 Year	21	6.5
	1-2 Years	94	29.3
	2-3 Years	69	21.5
	> 3 years	137	42.7
How frequent did you use mHealth technology service	Daily	33	10.3
	Monthly	131	40.8
	Occasionally	62	19.3
	Weekly	95	30

Gender Distribution
Gender is one of the common characteristics of academic surveys. The features have two categories, male and female. The majority of the respondents were belonging to the male group with a percentage of 81.3% with frequency of 261. Followed by the female group, which had a percentage of 18.7 % frequency of 60. The distribution of feature, the

majority was belonging to male group is normal in the society because of the society culture. The numerical results are proposed in Table 4 and an Infographic representation of gender distribution is proposed in Figure 4.1.

Age group Distribution
Age group is another common characteristic of academic surveys. The feature has four categories, 15-25 years old, 26-30 years old, 31-40 years old, and above than 40 years old.

The majority of the respondents were belonging to 15 to 25 years old group with percentage of 44.9% and Frequency of 144.
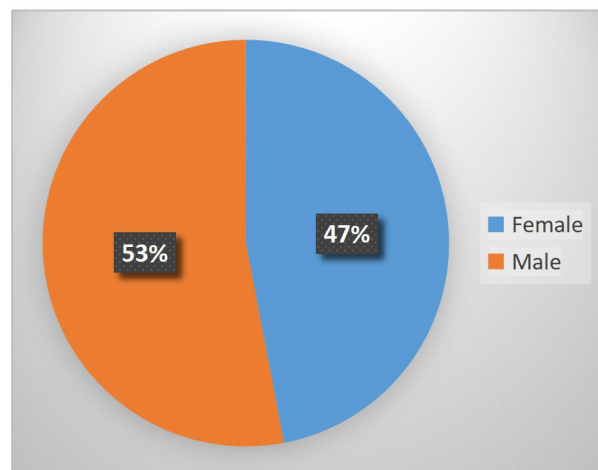
Figure 4. Gender Distribution

Followed by 26-30 years old group with percentage of 38% and Frequency of 122. Followed by 40 years old and above group which had a percentage of 8.7% and Frequency of 28. The last group was 31-40 years old group with a percentage of 8.4% and Frequency of 27. The distribution of feature, the majority were belonging to 15-25 years old group, is normal in the society because of the normal age distribution. The numerical results are proposed in Table 4.1 and a graphic representation distribution is proposed in Figure 5
Figure 5. Age group Distribution
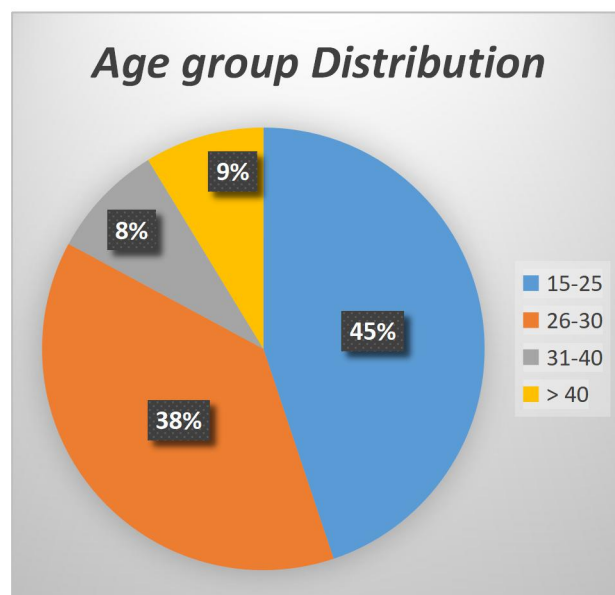
Level of Education Distribution
Level of Education Distribution is another common characteristic of academic surveys. The features have five categories, Postgraduate, Degree, Secondary School, Primary School and No- education. The majority of the respondents were belonging to Degree group with a percentage of 49.2% and frequency of 158. Followed by the secondary school group with a percentage of 28.3% and frequency of 91. While primary school comes in the third group with a percentage of

10.9 % and frequency of 35. Meanwhile postgraduate comes in the fourth group with a percentage of 11.6% and frequency of 37 respondents. The numerical results are proposed in Table 4.1 and a graphic representation distribution is proposed in Figure 6

How long did you use mHealth technology services Distribution
How long did you use mHealth technology services Distribution is another common characteristic of academic surveys. The features have four categories, < 1 Year, 1-2 Years, 2-3 Years, and > 3 years. The majority of the respondents were belongs to above 3 years group with a percentage of 42.7% and frequency of 137. Followed by the 1-2 years group with a percentage of 29.3% and frequency of 94. While 2-3 years
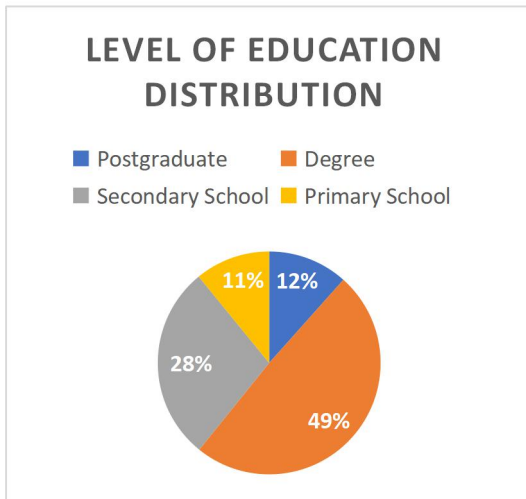

Figure 6. Level of Education Distribution

group comes in the third group with a percentage of 21.5 % and frequency of 69. The least group was less than a year comes in the fourth group with a percentage of 6.5% and frequency of 21. The numerical results are proposed in Table 4.1 and a graphic representation distribution is proposed in Figure 7

How frequent did you use mHealth technology service Distribution
How long did you use mHealth technology services Distribution is another common characteristic of academic surveys. The features have four categories, Daily, Monthly, Occasionally, and Weekly. The majority of the respondents were belongs to Monthly group with a percentage of 40.8% and frequency of 131. Followed by the weekly group with a percentage of 29.6% and frequency of 95. While occasionally group comes in the third group with a percentage of 19.3 % and frequency of 62. The least group was daily comes in the fourth group with a percentage of 10.3% and frequency of 33. The numerical results are proposed in Table 4.1 and a graphic representation

distribution is proposed in Figure 8

Second
What are the most important factors that motivate you to

continue use mhealth in diabetes treatment and consultations?
As shown in Table 3 and Figure 9, respondents demonstrated that quality services system is the core factor that influence their behaviour to continue use mhealth in diabetes treatment.
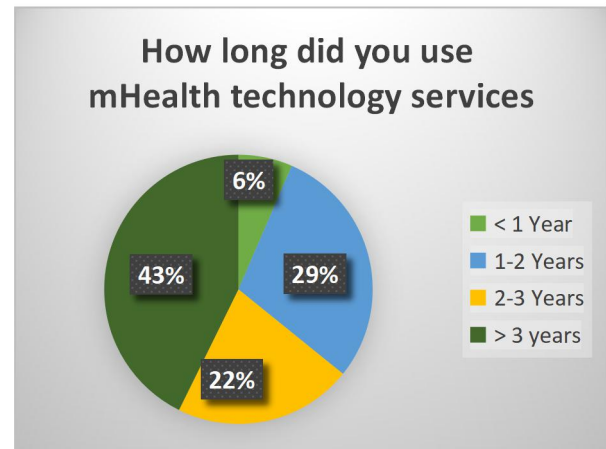

Figure 7. How long did you use mHealth technology services Distribution
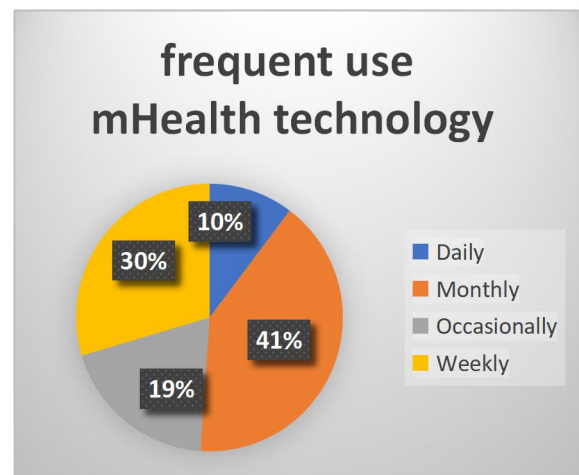

Figure 8. How frequent did you use mHealth technology service Distribution

The majority of the respondents emphasize that quality interaction through Good treatment interaction, Responsiveness, Polite and reaching the heart, Good advices, Respect, Trust and privacy conversation and Care. Based on the definition of the terms, the findings of the study show that interaction quality through the readiness to deliver the requested services and solve patients' problems influence the continuous intention to use mealth. In addition, a high level of confidence that demonstrated by service provider with care to reach users' preferences that facilitate their interaction in service designing and customizing influence users' intention to continue use specific mhealth compared to others. The results of the study are consistent with the findings in previous studies (Hossain, Quaddus, & Islam, 2016; Huang, Lin, & Fan, 2015; Keikhosrokiani, Mustaffa, Zakaria, & Abdullah, 2019; Pai & Huang, 2011; Shareef, Baabdullah, Dutta, Kumar, & Dwivedi, 2018; Slade, Williams, Dwivedi, & Piercy, 2015; Zhang, Liu, Chen, & Gong, 2017). Second, the quality of the system was shown to be the second important factor, which

includes system privacy, easy and flexible, trust, connectivity and efficiency. This research argues that data processing capability of a system, in terms of the ability of a system to integrate data from different places, can effectively influence high use and increase satisfaction among users which is in consistent with study by (Ramkumar, Schoenherr, Wagner, & Jenamani, 2019), which can be improved through enhancing s system useful, privacy available, reliable, adaptable and gives a timely response (Akter, D'Ambra, & Ray, 2013; Akter, Wamba, & D'Ambra, 2019; Delone; McLean, 2003). Finally, quality of the information was also shown to be important factor to address users' continuous use, which includes useful information, New information, interested information, improve my understanding and Satisfy my needs. The quality of connection (access to stable mobile service with less interruption of connection); content quality (value and usefulness of information provided); interaction quality (which is the service provider's easy and efficient way of interacting with consumers); and contextual quality (that is the timeliness with which customers can have unrestricted access to information irrespective of time and location) are all important to meet users' continuous to use. Information system quality entails reliability of service; the capability of the system to store significant amounts of information; privacy and security of patients' information as well as updating of patients' records; technological issues involves accessibility and updating of software as well as restriction barriers for unauthorized persons from having access to or making of adjustment to patients' health records; managerial issues which include training of healthcare personnel and management of cost; and finally, medical issues such as how specific contents of medical information are presented or communicated to patients. This research confirms studies by (Hossain et al., 2016; Huang et al., 2015), concluded that mhealth quality service through information

quality leading to user satisfaction. Indeed, utilitarian information influences users' continuous to use and their satisfaction if the provided information is well fits with actual purpose and meets several criteria such as "It serves its purpose very well" or "It is very useful". Thus, this research emphasizes that utilitarian information (i.e. usefulness) in IS plays a critical role in promoting appositive response by users to information, which is in consistent with studies by (Akbar, Coiera, & Magrabi, 2020; Akter et al., 2019).

Factors	Respondents
system privacy	187
easy and flexible	176
trust	156
connectivity	177
Efficiency	178
useful information	202
New information	199
interested information	165
Improve my understanding	143
Satisfy my needs	123
Good treatment interaction	255
Responsiveness	211
Polite and reaching the heart	209
Good advices	241
Respect	230
Trust and provacy conversation	211
Care	270

Figure 9. Factors Affecting Users Continous Use mhealth.

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Figure 9. Factors Affecting Users Continous Use mhealth
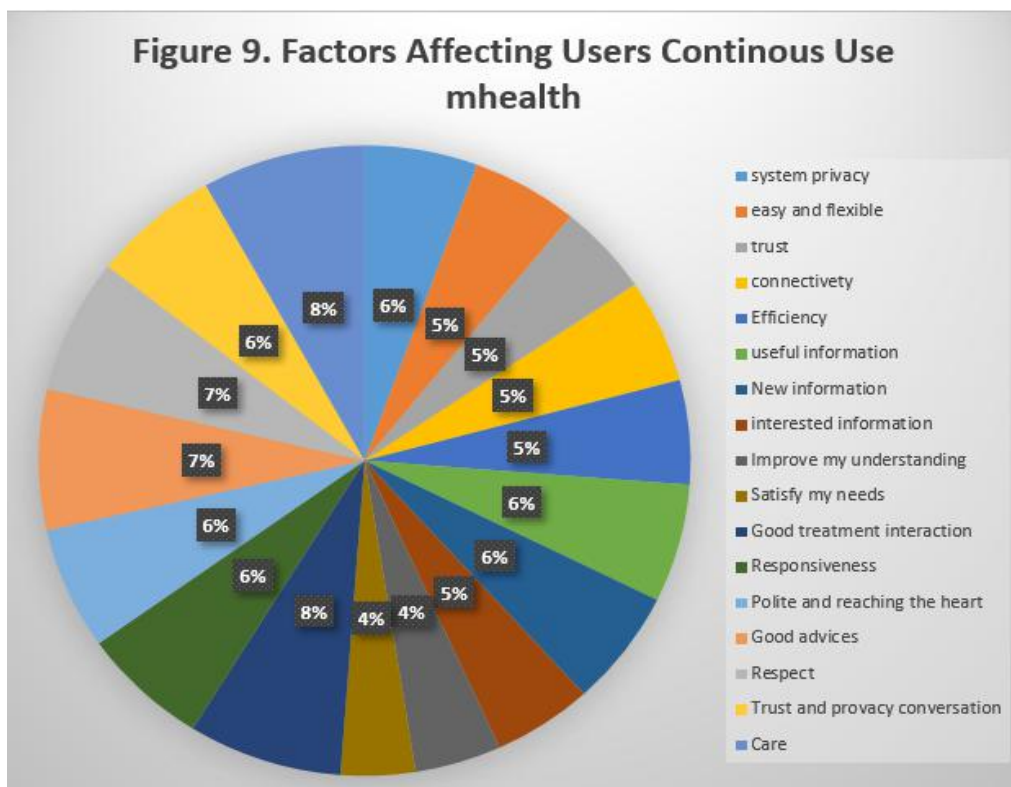
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