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Research Article

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Using of Digital Home Devices and Mobile Health Applications during Pregnancy: Acceptance and Concerns

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ABSTRACT

Background: There is a significant demographic transition and economic development taking place in the Arab countries. Women's health and reproductive healthcare services are also affected by this transition. In digital health, technology is used to improve patient care through telemedicine, mobile health, electronic health records, and artificial intelligence.

Aim: the study examined women's acceptance of digital health devices and mobile Apps during pregnancy, as well as their perceived barriers to using it.

Methods: a cross-sectional study was conducted at maternal and children Minia University Hospital, included 880 patients from obstetrics and gynecology departments. Self-administered questionnaires are used for data collection. The questionnaire consisted of three sections: (a) background information and obstetric history (b) adoption of health-related applications (c) acceptance, barriers, and concerns.

Results: the majority of respondents (76.7%) accepted the use of a digital device or an app to keep track of the mother and fetus during pregnancy. About one third (33.9%) of participants used mobile health apps. The lack of recommendations from healthcare providers and the cost were cited by (3.9%) and (3%) of respondents, respectively, as reasons for limited use of digital devices or mobile apps. A negative correlation exists between women's age and their readiness to use digital devices and apps (P value 0.034). Using digital devices and apps is highly correlated with women's education level, language preference, and cost of payment (P value 0.000).

Conclusion: In obstetrics, telehealth interventions, such as remote monitoring, improve outcomes. With digital home devices and apps, obstetric care can be improved. This includes eliminating travel, detecting complications early and preventing recurrences, and reducing the need for hospital admissions. A recommendation for the upcoming research is to identify the apps pregnant women are willing to use and choose the best app based on their perspectives.

Keywords: Acceptance and Concerns, Digital Home Devices, Mobile Health Applications, Pregnancy

Introduction

Each day, 800 women at risk of death from pregnancy and childbirth-related causes. Human rights demand making motherhood safer [1]. There is a great deal of interest in reproductive health in the Arab region. Different healthcare policies and traditions help shape the services offered in different regions [2].

The Arab region achieved a 45% reduction in its maternal mortality ratio between the year 2000 and 2020, with a decrease from 260 deaths per 100,000 live births in 2000 to 145 in 2020 [1]. Arab countries are experiencing major changes that impact economic progress and demographic change. Women's health and reproductive healthcare are also affected by this transition [2].

The importance of prenatal care, monitoring, and postnatal care for women during pregnancy and their infants cannot be

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overstated. Monitoring a pregnancy generally relies on regular visits with medical professionals, offering only brief views of maternal and fetal health [3]. Remote pregnancy monitoring, however, provides an additional method, aiding in the early identification of health status, physiological parameters, abnormal signs, and potential complications [4]. In addition to enabling closer attention and preventing complications, this innovative method holds promise for enhancing prenatal care [5].

Providing evidence-based information and education on healthcare to expectant women is crucial for ensuring maternal and neonatal health. The majority of pregnancies are uneventful, but high-quality antenatal care is essential to prevent complications and to manage those that do arise [6,7].

The importance of maternal and child healthcare is increasing among governments [8]. In digital healthcare, information and communications technologies are used to improve and optimize health and lifestyle management as well as diagnose and treat illnesses [9]. Mobile devices have gained value among other digital technologies for finding health information anywhere and anytime [10]. With the help of innovative technologies, and particularly homecare devices, antenatal care can be transformed in order to improve the health of mothers and newborns [11].

Pregnant women tend to seek information and advice online or via mobile applications [4]. The development of technologies that support gestational monitoring and allow women to check their prenatal care has been a major focus of research in the last decade [8]. Another innovative technology that is transforming pregnancy care is wearable technology. Wearable technology can monitor the health parameters of mother and foetus, such as heart rate, blood pressure, and foetal movement. As a result of this technology, potential complications can be detected earlier [12,13].

The use of telehealth in women's health is increasing in nearly every aspect [14]. Continuous monitoring of pregnancy with smart wearable devices could provide a comprehensive picture of fetal well-being based on an extensive collection of data [15]. A growing number of pregnancy care services are being provided on mobile technologies [16].

Significance

Many health conditions can now be measured using homecare technologies. As well as improving patient-provider interactions, wearable sensors and other smart technologies may play an important role in detecting adverse pregnancy-related health events [17]. In addition to scheduled prenatal care visits, smart technology may be especially useful in monitoring subclinical changes in health status during pregnancy.

Aim of the Study

The purpose of the current study was to evaluate women's acceptance of digital health devices and mobile apps during pregnancy, as well as their perceived barriers to utilizing it.

Subjects and Methods

Research design: Descriptive cross-sectional study using a survey.¶

Setting: Maternal and Children's Minia University hospital, which serves as the city's main referral hospital.

Sampling: The survey was conducted between September 2024 and February 2025. Respondents were obligatory to be between 18 and 50 years old, pregnant or recently delivered (within six months after delivery); and ready to fill the paper or e-survey.

Tools: In order to assess women's acceptance and barriers to use of mobile health applications and home care devices during pregnancy, an 18-item questionnaire, including consent and screening questions, was adapted from previous research evaluating health literacy among women, acceptance of pregnancy apps on smartphones and another home devices [18-20]. This questionnaire consisted of three sections: (a) information about background and demographics (e.g., age, education, etc.) and some obstetric information (number of parities, pregnancies, etc.). (b) Adoption of health-related application (c) acceptance, barriers and concerns about use (e.g., confidentiality worries about data stored on smartphones and type of health monitoring, etc.). The questionnaire was estimated to take four to six minutes to complete. A total of 20 women participated in the pilot testing, which was then analysed for accessibility issues and errors. Experts validated and verified the reliability of the questionnaire before administering it.

Ethical Consideration

An ethics approval (REC2024102) was obtained from Faculty of Nursing Research Ethics Committee for this research involving humans. All respondents delivered informed consent before taking part in the study. The researcher explained the purpose of the study to mothers who participated, and the participants were reassured that their participation was voluntary, and they could withdraw at any time. The collected information was kept confidential.

Results

A total of 880 women filled out the study survey. A general and obstetric history description of the sample is given in Table 1. More than half 528 (60%) of the participants were 18-30 years of age, and near to two thirds (63.2%) were unemployed. Regarding educational level of the woman, the majority 451 (51.3%) of the participants had a university degree or higher. A total of 286 (32.5%) participants had 1 pregnancy. Approximately one-third of the participants 307 (34.9%) had one live birth. The majority of participants 665 (75.6%) did not experience pregnancy loss or miscarriage.

Table 2 shows how participants adopted health-related applications. A total of 675 (76.7%) respondents reported accepting the use of a digital device or an app to keep track of the mother and foetus during pregnancy. In regard to the presence of a health application (app) on the mother's smartphone, more than one third (33.9%) of the participants reported having one or more of it, but 530 (60.2%) don't have any. Arabic is the preferred language for using digital health apps 254 (28.1%). There were 107 (12.2%) participants who frequently used digital health apps once or twice a day. As for the benefits of using a digital health apps, 124 (14.1%) participants chose easy to reach and accessible, followed by 109 (12.4%) participants who chose ease of use and coast less among 66 (7.5%). In regard to

payments for a pregnancy monitoring device and digital health apps, 163 (18.5%) said they could pay one thousand pounds or less, while 130 (14.8%) said they preferred never to pay.

Table 1: General characteristics of the study sample (N=880)

Items		Number	Percent %
Age	from 18 to 30	528	60.0%
	from 31 to 40	287	32.6%
	from 41 to 50	65	7.4%
Occupation	Employed	280	31.8%
	Student	44	5.0%
	Unemployed	556	63.2%
Level of education	Illiterate	64	7.3%
	Primary school or diploma	365	41.5%
	University or higher	451	51.3%
Number of pregnancies	1 pregnancy	286	32.5%
	2 pregnancies	275	31.3%
	3 pregnancies	183	20.8%
	4 or more pregnancies	136	15.5%
Number of live births	1 live birth	307	34.9%
	2 live births	298	33.9%
	3 or more live births	215	24.4%
	None	60	6.8%
Number of pregnancy loss	1 miscarriage	150	17.0%
	2 miscarriages	47	5.3%
	3 miscarriages	10	1.1%
	4 or more miscarriages	8	0.9%
	None	665	75.6%

Table 2: Adoption of Health-Related Application

Items		Number	Percent %
Acceptance of using of a digital device and apps to keep track of mother and fetus	No	205	23.3%
	Yes	675	76.7%
Presence of application (app) related to health in mother smartphone	No	530	60.2%
	Yes	350	39.8%
Preferred language to use the digital health apps	Don't have	530	
	Arabic	254	28.9%
	English	54	6.1%
	I prefer pictures and visual symbol	42	4.8%
Frequently use of the digital health apps		530	60.2%
	Never used	27	3.1%
	Once a week	96	10.9%
	Once or twice a day	107	12.2%
	Once per month	52	5.9%
	Rarely used	36	4.1%
	Several times a day	32	3.6%
Benefits of using a digital health app		530	60.2%
	Coast less	66	7.5%
	Ease of use	109	12.4%
	Easy to reach and accessible	124	14.1%
	Never used	20	2.3%
	Up to date	31	3.5%
Possibility of payment for such a pregnancy monitoring device and digital health apps		530	60.2%
	1000 or less	163	18.5%
	From 2000 to 5000	43	4.9%
	More than 5000	14	1.6%
	Never pay	130	14.8%
Pregnancy	No	762	86.6%
	Yes	118	13.4%

Table 3 illustrates acceptance, barriers and concerns among participants about using home digital devices and mobile digital health apps. Regarding Barriers for use of home device and digital health apps, majority of the respondents 332 (37.7%) reported that lack of adequate skill to use application is the most barrier, followed by lack of knowledge and awareness of application benefits reported by 310 (35.2%). As for the reasons for limited use of home digital devices or mobile apps, 35 (3.9%) of respondents cited lack of recommendations from healthcare providers, while 27 (3%) cited high cost. More than half of the respondents agree or strongly agree that they are concerned about the privacy of digital data. More than half of the respondents agree or strongly agree that they are concerned about the efficacy and accuracy of these tests and devices. Almost two-thirds of respondents agree or strongly agree that digital devices at home and mobile apps can improve health and reduce disease risks.

Table 3: Acceptance, Barriers, and Concerns

Barriers for use of home device and digital health apps	Lack of adequate skill to use application	332	37.7%
	Lack of adequate time to use applications	132	15.0%
	Lack of knowledge and awareness of application benefits	310	35.2%
Barriers for use of home device and digital health apps	Lack of support and update of applications by their developers	106	12.0%
	Complicated to use	58	6.6%

Reasons of limited use of home device and digital health apps	I am not interested in health apps	109	12.4%
	I don't have competency to use	114	13.0%
	I don't trust apps to collect my data	130	14.8%
	I use it	350	39.8%
	Lack of recommended by healthcare providers	35	3.9%
	My health is fit and I don't need one	57	6.5%
	They cost too much	27	3%
	Strongly agree	159	18.1%
	Agree	346	39.3%
Concerns about the privacy "data stored"	Neutral	243	27.6%
	Disagree	108	12.3%
	Strongly disagree	24	2.7%
	Strongly agree	103	11.7%
	Agree	388	44.1%
Concerns about the efficacy and accuracy	Neutral	250	28.4%
	Disagree	124	14.1%
	Strongly disagree	15	1.7%
	Strongly agree	172	19.5%
	Agree	419	47.6%
	Neutral	207	23.5%
Accepting it as improving health and reduce the risk of disease	Disagree	67	7.6%
	Strongly disagree	15	1.7%

The factors associated with women's willingness to use digital devices and apps are summarized in Table 4. There is a significant correlation between women's age, educational level, language preferences, cost, or payment they can pay with their wiling's to use home digital devices and mobile apps.

There is a negative correlation between women's age and their readiness to use digital devices and apps (P value 0.034). Women's education level, language preference, and cost of payment are highly significant correlates to their willingness to use digital devices and apps (P value 0.000).

Table 4: Factors Associated with Women's Willingness of Using Digital Devices and Apps

Age	Pearson Correlation	-.071*
	Sig. (2-tailed)	.034
Level of education	Pearson Correlation	.224**
	Sig. (2-tailed)	.000
Number of pregnancies	Pearson Correlation	-.040
	Sig. (2-tailed)	.236
language preferred to use the application	Pearson Correlation	.211**
	Sig. (2-tailed)	.000
willing to pay for such a pregnancy monitoring device or app	Pearson Correlation	.162**
	Sig. (2-tailed)	.000
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Discussion

Using digital devices such as cell phones and wearable devices or home health devices has become a crucial part of daily life in today's technologically advanced world. Monitoring the health of the pregnant woman and the fetus is essential to maintaining women's health and dealing with pregnancy or childbirth [21].

The present study found that the majority of respondents (76.7%) accepted the use of a digital device or an app to keep track of the mother and fetus during pregnancy. About one third (33.9%) of participants used mobile health apps. Our findings are similar to those of a study in Australia which found that almost half of the study participants were frequent mobile app users while pregnant, and most (78%) said they wished to use them in the future [10].

In the present study, the lack of recommendations from healthcare providers and the cost were cited by (3.9%) and (3%) of respondents, respectively, as reasons for limited use of digital devices or mobile apps. In line with that, a study by M, 2020 found that consumers are unable to evaluate the credibility of an app successfully without health care professional's assistance [22,23]. Similarly, many studies, show that health professionals may support pregnant women's use of mHealth apps [24,25].

In the present study, a significant negative correlation exists between women's age and their readiness to use digital devices and apps (P value 0.034). Using digital devices and apps is highly correlated with women's education level, language preference, and cost of payment (P value 0.000). The findings of our study are consistent with previous literature that found women who were older or with low education levels used pregnancy apps at a lower rate [26,27]. Another study found that, the woman preferred using apps in their mother tongue, which has substantial accessibility implications [23].

According to the present study, women are concerned about privacy issues associated with digital devices and apps. Similar findings were found in the Tangari study of 2021, in which many users expressed concern about privacy [28].

Researchers have focused much attention on mHealth apps and associated privacy risks [29]. Several concerns about confidentiality and data security were raised by women in another studies [30,31]. When it comes to women's health, apps, and use of devices during pregnancy, healthcare providers need to pay more attention.

Conclusion

In obstetric healthcare, continuous remote monitoring through wearable devices is emerging as an interesting approach. By using obstetric telemonitoring during pregnancy, gestational care can be improved, reducing the need for travel, and enabling early detection and prevention of complications before hospitalization. Healthcare providers can optimize maternal and birth outcomes

by developing evidence-based, culturally-adapted mobile apps. However, further investigation and research are needed, particularly focusing on larger sample sizes. A recommendation for the upcoming research is to identify the apps pregnant women are willing to use and choose the best app based on their perspectives. As digital technologies like apps become more prevalent during pregnancy, attention must be paid to making sure they are safe and effective.

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