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| RESEARCH ARTICLE

Use of Health App for Booking Primary Health Care appointments in Buraidah, Qassim Province

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| ABSTRACT
The pattern of booking Primary Health Care appointments and use of Health apps for this purpose has not been evaluated in Qassim Province, Saudi Arabia. Therefore, this study aimed to determine the proportion of patients who booked appointments before attending primary health care centers (PHCCs), the magnitude of Health App usage for appointment booking, reasons for not taking appointments, ease of use and the level of satisfaction with the Health App, and the association of demographic factors with Health App usage. A cross-sectional study was conducted using an online survey. The data were collected from the patients attending PHCCs in Buraidah City, Qassim province, Saudi Arabia. Overall, 282 respondents (164 males and 118 females) completed the survey. A total of 154 (54.6%) participants had booked their appointments on the day of the survey. Regarding Health App, 220 (78%) respondents had 'ever used' it for booking appointments at PHCCs. Reasons for not booking appointments included a lack of awareness about the app and ignorance of the importance of booking an appointment. Overall, participants expressed a high level of satisfaction with the Health Apps, particularly in terms of well-organized information and ease of learning to use the app. Factors associated with adherence to appointment booking included age ($p<0.0001$) and marital status($p<0.0001$), with participants younger than 25 and older than 50 years being less adherent. Educational level ($p<0.0001$) and income ($p<0.0001$) also significantly influenced appointment booking. Similarly, factors associated with Health App usage included age($p<0.0001$), marital status ($p<0.0001$), education level ($p<0.0001$), income ($p<0.0001$), and occupation ($p<0.0001$). The insights gathered from this study can inform healthcare providers and policymakers in enhancing the user experience of the Health App, ultimately leading to improved healthcare service delivery and patient outcomes.

| KEYWORDS

Cross-sectional study; Health App; mobile application; primary health; survey; Saudi Arabia

| ARTICLE INFORMATION

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1. Introduction

Primary health care (PHC) is the first line of defense and an essential component of the healthcare system (Jelercic et al., 2010). Given the significance of PHC, health institutions worldwide are continuously striving to develop and enhance PHC systems (Kringos et al., 2010). The family physician plays a crucial role in primary health care, serving as the frontline of defense for the healthcare system and the primary gateway for anyone seeking healthcare services (Almalki et al., 2011). Although continuous developments have been made to improve health care, it is still facing gaps and challenges that necessitate new strategies for enhancing primary health care (Almalki et al., 2011).

As the foundation of healthcare, primary healthcare centers should be readily accessible to all segments of the population. Accessibility is influenced by seven key factors, encompassing availability, geographic access, accommodation to specific needs (e.g., mobile health applications), affordability, acceptability, utilization, and equality (Kringos et al., 2010). Enhanced accessibility

not only fosters continuity of care but also leads to reduced costs, improved quality of care, and increased patient satisfaction (Yaphe, 2017). The ease of access directly correlates with patient satisfaction, which serves as a crucial indicator of the quality of primary care (Altin & Stock, 2015; Berta et al., 2005).

Generally, the workload is high on primary health care services. There are varied reasons for primary health care visits. Globally, studies are conducted to determine the workload and pattern of patient visits in primary health care. A study took place in Germany with 2,866 patients aged 65 years and older. In this study, a total of 4,426 reasons for visits were found. The findings showed that approximately half of the reasons (54.3%) were not related to acute complaints. Follow-up visits, medical examinations, blood tests, and medication prescriptions or injections were the main reasons for primary health care visits (Frese et al., 2016). Another study, conducted in Poland in 2016, included 450 patients. The age groups predominantly seeking health care services were those between 20 and 30 years old and those between 50 and 70 years old. According to the study findings, the primary reasons for patient visits to doctors at PHC facilities were seeking treatment for infections, requesting medication refills, and asking for referrals (Pietrzak et al., 2018).

In Saudi Arabia, researchers have explored various aspects of the primary health care system. Studies have reported issues with the accessibility and availability of primary health care services leading to patient dissatisfaction and compromised quality of health care. Improvement in primary healthcare management is suggested to meet the demands of healthcare services and to improve patient satisfaction (Al Saffer et al., 2021).

The implementation of technology in the healthcare system is a crucial strategy to improve healthcare services by increasing availability and facilitating convenient access (Ren et al., 2015). The integration of technology can lead to a reduction in consultation time and improve patients' health outcomes (Gonçalves-Bradley et al., 2018; Agarwal & Biswas, 2020). In the context of Saudi Arabia, there have been some initiatives to introduce applications in the healthcare field, one of which is "'Health App" that was introduced by the Ministry of Health (MOH) (Alsalamah et al., 2020). The application enables individuals to access healthcare services from anywhere, providing the convenience of online visual/auditory consultations with specialists (Alsalamah et al., 2020). This application empowers patients to schedule appointments and gives them the flexibility to select the location, time, and preferred physician (Alsalamah et al., 2020).

One of the important aspects of PHC management is to devise an appropriate patient appointment system. Patients without booked appointments lead to increased workload and difficulty in giving adequate time to individual patients, affecting the quality of PHC services. Although "'Health App" provides the facility for booking PHC appointments, anecdotal evidence shows that a substantial number of patients attend Primary Health Care Centers (PHCCs) without taking an appointment. Therefore, it is crucial to investigate the extent and underlying reasons behind patients not booking appointments before visiting PHCCs.

The objectives of this study were to determine the proportion of patients seeking appointments before attending PHCCs in Buraidah, Qassim, Saudi Arabia, and to assess the magnitude of Health app usage for booking appointments at these PHCCs. Additionally, the study aimed to explore the reasons for not taking appointments prior to attending PHCCs, evaluate the level of satisfaction among PHC patients regarding the use of the Health app for appointment booking, and investigate the association between patients' demographic factors and the utilization of the Health app for appointment booking at PHCCs clinics in Buraidah, Qassim, Saudi Arabia.

2. Methodology

A cross-sectional study was conducted between December 18, 2022, and May 1, 2023. The sample size was calculated by using OpenEpi sample size calculator. Based on the population size, anticipated frequency of Health App use, confidence level of 95%, and a margin of error of ± 5%, the calculated sample size was 288 persons.

Out of the total 40 PHCCs located in Buraidah, six were selected by convenience sampling. Three urban and three rural PHCCs were selected in order to give equal representation to urban and rural populations.

2.1 Eligibility Criteria for the study participants

Inclusion criteria: Saudi patients attending the selected primary health care centers.
Exclusion criteria: Non-Saudi patients, visually impaired, handicapped, and patients having psychiatric illness.

2.2 Study Instrument

An online survey was conducted. A semi-structured questionnaire was used for data collection. The survey questionnaire included questions related to various features of the application. The questionnaire was divided into four sections. The first section included 6 questions about participants' demographic information, the second section had 7 questions about patient appointment booking

or otherwise and reasons for not booking the third and fourth sections included 5 aspects related to ease of use and 6 aspects related to user satisfaction regarding Health app, respectively. The first two sections included in the questionnaire were both multiple choice and open-ended questions. The third and fourth sections had items rated on a scale of 1–5 using a Likert scale (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree). The questionnaire was designed in English, which was later translated into Arabic. The questionnaire was back-translated to check for the accuracy of the translation. The Google Forms web application was used in preparing the online version of the questionnaire, and a survey link was generated for accessing the survey.

Fifteen patients visiting a primary health care center were randomly selected to pre-test the questionnaire. The questionnaire was found to be clear and understandable, and no modifications were required as a result of pre-test.

2.3 Statistical Analysis

The responses from Google Forms were downloaded as a Microsoft Excel file. Data coding and cleaning were performed before exporting data to Statistical Package for Social Sciences (SPSS). Statistical analysis was done using SPSS version 21 (SPSS Inc., Chicago, IL). Frequencies and percentages were used to describe categorical variables, while mean/median and standard deviation were used for continuous variables. *P* value $\leq$0.05 were considered significant. To examine the association between the variables, Chi-square test was used for categorical variables, while *t*-test and ANOVA were used for numerical variables.

2.4 Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Confidentiality and anonymity were maintained throughout the study, and no name or medical record number was documented. The study was approved by Qassim Regional Research Ethics Committee. Informed consent was taken from all study participants.

3. Results

A total of 282 respondents, 164 (58%) males and 118 (42%) females, completed the survey. The majority (61.3%) were in the age group of 26-50 years. More than half (52.1%) of the participants were married (Table 1).

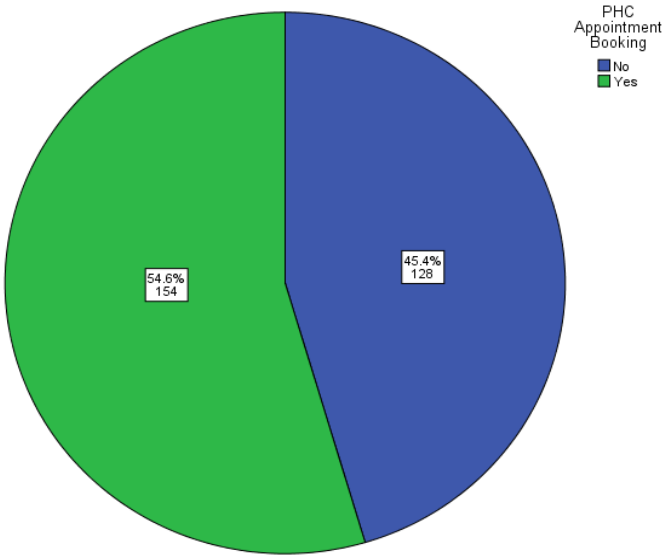
Table 1: Demographic Characteristics of the Survey Participants (n=282)

	Number	Percent
Gender		
Male	164	58.2
Female	118	41.8
Total	282	100.0
Age Group		
25 or less	73	25.9
26-50	173	61.3
More than 50	36	12.8
Total	282	100.0
Marital Status		
Single	104	36.9
Married	147	52.1
Divorced	24	8.5
Widow	7	2.5
Total	282	100.0
Education		
Primary	36	12.8
High School	93	33.0
Diploma	50	17.7
Bachelors	85	30.1
Master or higher	8	2.8
Illiterate	10	3.5

Total	282	100.0
Occupation		
Student	54	19.1
Teacher	42	14.9
Military	37	13.1
Health worker	14	5.0
Business	32	11.3
Retired	103	36.5
Total	282	100.0
Income		
Less than 10000	195	69.1
10000 to 20000	79	28.0
More than 20000	8	2.8
Total	282	100.0
PHC Location		
Urban	144	51.1
Rural	138	48.9
Total	282	100.0

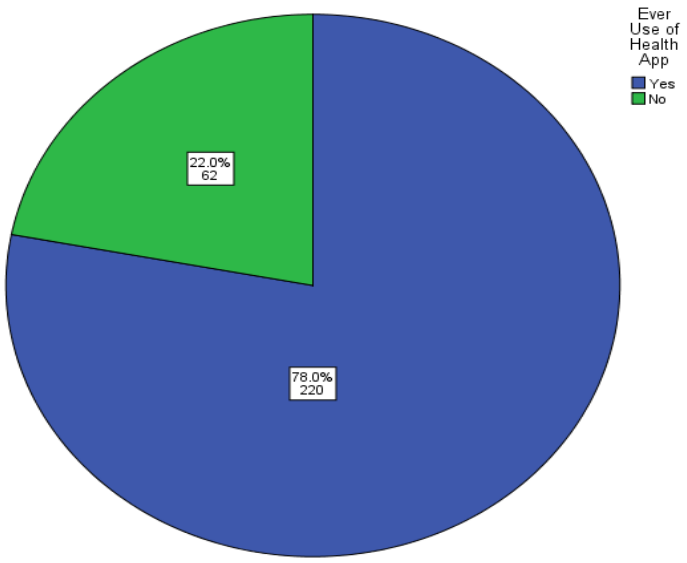
Figure 1 shows that 154 (54.6%) of the participants had booked an appointment at Primary Health Care Centers on the day of the survey.

Figure 1: Proportion of survey participants who had booked PHC appointments (n=282)



A total of 220 (78%) respondents had ever used the Health App for booking PHC appointments (Figure 2).

Figure 2: Use of Health App for booking PHC appointment by the survey participants (n=282)



The reasons for not booking appointments included not being aware of the importance of booking an appointment, not knowing about Health App, considering the health condition an emergency, and unavailable appointments.

Table 2 displays the mean scores for the statements assessing ease of use of Health App. The highest mean score was obtained for the statement regarding well-organized information (4.86±0.41), followed by easy to learn using the Health App (4.85±0.43).

Table 2: Survey Participant's responses regarding Health App Ease of Use

Statement	Mean Score*	Std. Deviation	Minimum	Maximum
It was easy for me to learn to use the app	4.85	0.43	3.0	5.0
The information in the app is well organized	4.86	0.41	3.0	5.0
I easily find the information I need	4.77	0.50	3.0	5.0
I can use the app without the need for written instructions	4.81	0.56	2.0	5.0
If I make a mistake using the app, I can undo it easily	4.67	0.64	2.0	5.0

*****Total Possible Score Range: 1 - 5*

Among the statements for the level of satisfaction (Table 3), the highest mean score was obtained regarding the recommendation of Health App to others (4.95±0.26), followed by the statement, "The app provides a convenient way to access health care services" (4.94±0.38). The statement, "This app contains all the functions and features I expect", had the lowest score (4.17±0.93).

Table 3: Survey Participant's responses regarding satisfaction with Health App

Statement	Mean Score*	Std. Deviation	Minimum	Maximum
The app provides a convenient way to access health care services	4.94	0.38	1.0	5.0
I experience problems while using the application	4.38	0.84	1.0	5.0
This app contains all the functions and features I expect	4.17	0.93	1.0	5.0
Using the app saves my time	4.90	0.48	1.0	5.0
Overall, I am satisfied with this app	4.67	0.52	3.0	5.0
I recommend others to use this app	4.95	0.26	3.0	5.0

The health care workers were the most common source of information regarding Health App. More than a quarter (27.7%) of study participants received Health App information from social media (Table 4).

Table 4: Survey Participant's source of information about Health App

Source of Information	Number	Percent
Health Care Worker	96	54.2
Social Media	49	27.7
Family	20	11.3
Friend	12	6.8
Total	**177**	**100.0**

On analyzing the factors affecting adherence to appointment booking, it was found that the age groups of less than 25 years and those more than 50 years were less adherent to booking appointments for PHC. The difference among the age groups was statistically significant ($p<0.0001$). Similarly, adherence to booking appointments was significantly different ($p<0.0001$) among the marital status categories. The educational level ($p<0.0001$) and income ($p<0.0001$) of the study participants were also significantly associated with booking an appointment at Primary health care center (Table 5).

Table 5: Factors associated with booking PHC appointment by the survey participants (n=282)

		Appointment Booking		Total	Statistical Test	χ2 Value	p-value
		No	Yes				
Gender	Male	73	91	**164**			
	Female	55	63	**118**	Pearson Chi-Square	0.122	0.727
Total		**128**	**154**	**282**			
Age Group (Years)	25 or less	47	26	**73**			
	26-50	53	120	**173**	Pearson Chi-Square	41.052	<0.0001¶
	More than 50	28	8	**36**			
Total		**128**	**154**	**282**			
Marital Status	Single	59	45	**104**			
	Married	53	94	**147**			
	Divorced	9	15	**24**	Fisher's Exact Test	19.801	<0.0001¶
	Widowed	7	0	**7**			
Total		**128**	**154**	**282**			
Education	Primary	29	7	**36**			
	High School	56	37	**93**			
	Diploma	19	31	**50**			
	Bachelors	14	71	**85**	Fisher's Exact Test	79.239	<0.0001¶
	Master or higher	0	8	**8**			
	Illiterate	10	0	**10**			
Total		**128**	**154**	**282**			
Occupation	Student	38	16	**54**			
	Teacher	1	41	**42**			
	Military	12	25	**37**			
	Health worker	2	12	**14**		68.532	<0.0001¶
	Business	10	22	**32**	Pearson Chi-Square		
	Retired	65	38	**103**			
Total		**128**	**154**	**282**			
Income	Less than 10000	114	81	**195**			
	10000 to 20000	14	65	**79**	Fisher's Exact Test	46.949	<0.0001¶
	More than 20000	0	8	**8**			
Total		**128**	**154**	**282**			
Primary Health Care Centre Location	Urban	59	85	**144**			
	Rural	69	69	**138**	Pearson Chi-Square	2.317	0.128
Total		**128**	**154**	**282**			

¶ statistically significant at $p < 0.05$

Table 6 details the factors associated with the use of the Health App. Age group (p<0.0001), marital status (p<0.0001), education level (p<0.0001), income (p<0.0001) and occupation (p<0.0001) were significantly associated with the use of Health App.

Table 6: Association of Health App use with demographic characteristics of the survey participants

		Ever Used Health App					
		Yes	**No**	**Total**	**Statistical Test**	**χ2 Value**	***p*-value**
Gender	Male	133	31	**164**	Pearson Chi-Square	2.172	0.141
	Female	87	31	**118**			
Total		**220**	**62**	**282**			
Age Group (Years)	25 or less	54	19	**73**	Pearson Chi-Square	61.497	<0.0001¶
	26-50	155	18	**173**			
	More than 50	11	25	**36**			
Total		**220**	**62**	**282**			
Marital Status	Single	82	22	**104**	Fisher's Exact Test	20.412	<0.0001¶
	Married	117	30	**147**			
	Divorced	21	3	**24**			
	Widowed	0	7	**7**			
Total		**220**	**62**	**282**			
Education	Primary	10	26	**36**	Fisher's Exact Test	92.536	<0.0001¶
	High School	73	20	**93**			
	Diploma	46	4	**50**			
	Bachelors	82	3	**85**			
	Master or higher	8	0	**8**			
	Illiterate	1	9	**10**			
Total		**220**	**62**	**282**			
Occupation	Student	36	18	**54**	Fisher's Exact Test	52.355	<0.0001¶
	Teacher	42	0	**42**			
	Military	35	2	**37**			
	Health worker	13	1	**14**			
	Business	31	1	**32**			
	Retired	63	40	**103**			
Total		**220**	**62**	**282**			
Income	Less than 10000	138	57	**195**	Fisher's Exact Test	21.163	<0.0001¶
	10000 to 20000	74	5	**79**			
	More than 20000	8	0	**8**			
Total		**220**	**62**	**282**			
Primary Health Care Centre Location	Urban	116	28	**144**	Pearson Chi-Square	1.108	0.293
	Rural	104	34	**138**			
Total		**220**	**62**	**282**			

¶ statistically significant at $p < 0.05$

The evaluation of the Health App's "ease of use", conducted by 5 statements on a 5-point Likert scale, was summed up as a total score of 25. The computed mean score was 23.9±1.8. The minimum score was 15, while the maximum was 25. Gender, age, marital status, occupation, and income were not significantly associated with the 'Ease of Use' of the Health App. However, there was a statistically significant difference in the 'ease of use' scores among the different educational levels ($p = 0.02$).

The perception of the Health App's "satisfaction with use", determined by 6 statements on a 5-point Likert scale, was summed up as a total score of 30. The computed mean score for satisfaction with the use of the Health App was 27.9±2.5. The minimum

recorded score was 10, while the maximum score was 30. Gender, age, and marital status were not significantly associated with "satisfaction with Health App use". However, a Kruskal-Wallis H test showed that there was a statistically significant difference in the "satisfaction with Health App use" scores among the different occupations and income levels. A Kruskal-Wallis H test showed that there was a statistically significant difference in the satisfaction score between the different income groups, $\chi2(2) = 13.222$, $p = 0.001$, with a mean rank satisfaction score of 80.34 for income less than 10,000 SR, 73.66 for 10,000-20,000 and 79.94 for more than 20,000 SR monthly income. Similarly, there was a statistically significant difference in the satisfaction score between the different occupational groups, $\chi2(5) = 12.493$, $p = 0.029$, with a maximum mean rank satisfaction score of 90.75 for health care workers while a minimum mean rank satisfaction score of 81.28 for students.

When asked about comments and suggestions regarding Health App, the study participants presented a diverse array of recommendations. These suggestions included the addition of laboratory results and X-Ray images to the application, the inclusion of medical prescriptions, especially for chronic diseases, availability of options for choosing the name of the attending physician, requesting medical reports, and tracking medical referrals through the application. Furthermore, creating an option for setting appointment reminders through messages, notifications, or calls, was also suggested.

4. Discussion

The Ministry of Health, Saudi Arabia, launched various applications including Mawid, Sehha, Mawared, for a variety of purposes such as appointment booking and online consultations. However, in the first quarter of 2023, the Ministry of Health focused and limited the provision of health services to one application, named 'Sehaty' (Health App). Therefore, in our study, we focused on the Health App.

The current study revealed that only half of the participants (54.6%) had booked PHC appointments on the day of the survey. This finding underscores the importance of creating awareness regarding booking appointments prior to a visit to the Primary Health Care Center. In the current study, the common reasons for not booking appointments included a lack of awareness about the Health App and ignorance of the importance of appointment booking. The finding that substantial study participants did not book an appointment due to a lack of awareness of the importance of booking appointments underscores the need for creating awareness and promoting the benefits and significance of using Health Apps for accessing healthcare services. Moreover, further studies are needed to explore in-depth the reasons for not using Health Apps by focusing on privacy and security, which were identified in the previous studies as the major challenges affecting the adoption of Health applications (Chikhaoui et al., 2017).

An encouraging finding in our study is that more than three-fourths of the respondents (78%) had 'ever used' the Health App for booking PHC appointments, indicating its widespread adoption among the study population. This finding contrasts with another study conducted in Saudi Arabia which reported that 58% of the study participants had ever heard of the Sehaty app, while only 25% had used this App (Aldhahir et al., 2022).

The evaluation of the Health App's ease of use demonstrated high mean scores for all statements assessing the ease of use of the App. This finding is in accordance with a study conducted in Saudi Arabia in which 89% of the participants either strongly agreed or agreed that the Health App was easy to use (Aldhahir et al., 2022). The study participants reported a high level of satisfaction with the Health App, particularly regarding recommendations to others and the convenience it provides in accessing healthcare services. Similar to our study, another study reported that a high proportion of the respondents agreed that they would recommend the Health App to others (Aldhahir et al., 2022).

In the current study, health care workers emerged as the most common source of information about the Health App, while social media played a significant role in disseminating information to a substantial proportion of participants. These findings highlight the importance of involving healthcare professionals and using social media platforms for promoting and educating users about Health Apps.

The current study also identified several factors influencing adherence to appointment booking and the use of Health App. Age, marital status, educational level, income, and occupation were found to be significantly associated with both appointment booking and Health App utilization. The finding that those with higher levels of education better utilized the Health App signifies the fact that public awareness regarding the use of the Health App should have a focus on those with low education levels.

Our study shows that the public's experience and utilization of the Health App has improved compared to a previously published study (Aldhahir et al., 2022). The increased awareness about health digital technology, including Seha and other mobile health apps, can be attributed to efforts by the government, healthcare workers, and social media (Aljohani and Chandran, 2019). The utilization of the Health App has experienced significant growth due to various factors. These include continuous app development initiatives driven by the Ministry of Health (MOH) and the Saudi Data and Artificial Intelligence Authority to align with the goals of "Vision 2030." These efforts aim to enhance app reliability, increase technology adoption, and provide sustained access to

telemedicine and high-quality healthcare services. Additionally, improved internet network readiness and the availability of professional support teams have further contributed to narrowing the gap in factors affecting Health App usability.

Although interesting findings were identified in this study, there are certain limitations that should be taken into consideration when interpreting the findings. First, the survey relied on self-reported data from participants, introducing the potential for self-report bias. Participants may provide socially desirable responses or inaccurately recall their experiences, leading to biased information. Second, the study was conducted in selected PHC centers in a single city, limiting the generalizability of the study to the entire population of Saudi Arabia. Third, our study focused primarily on aspects related to appointment booking, ease of use, and satisfaction with the Health App. Other important variables, such as digital literacy and privacy concerns, were not explored.

The present study holds both theoretical and practical significance. Its findings would make a valuable contribution to the healthcare literature in Saudi Arabia, aiding decision-makers in formulating effective strategies to enhance mHealth utilization and foster the adoption of eHealth technologies.

Based on the findings and limitations of our study, we recommend that the users should be involved in the design and development of Health Apps by conducting user needs assessments, usability testing, and feedback sessions to optimize the user experience. We also recommend incorporating features suggested by users, such as laboratory results, medical prescriptions, and appointment reminders. Finally, continuous evaluation of the Health App needs to be conducted, and areas for improvement should be identified. This will ensure that the Health App meets evolving user needs and expectations, ultimately facilitating better access to healthcare services and improving patient outcomes.

5. Conclusion

This study aimed to determine the proportion of patients seeking appointments before attending PHCCs in Buraidah, Qassim, Saudi Arabia, and assess the magnitude of Health app usage for appointment booking at these PHCCs. Additionally, it aimed to explore the reasons for not taking appointments prior to attending PHCCs, assess patient satisfaction with the Health app for appointment booking, and determine the association between demographic factors and Health app utilization.

The study revealed that slightly more than half of the participants booked appointments on the day of the survey; around three-fourths had ever used the Health app for PHC appointment booking. Participants expressed high satisfaction with the app's ease of use. Demographic factors such as age, marital status, education level, income, and occupation significantly influenced Health app usage and appointment booking behavior.

Despite its valuable findings, the study had limitations, including reliance on self-reported data and limited generalizability due to its focus on selected PHC centers in a single city. Additionally, certain variables, such as digital literacy and privacy concerns, were not explored.

Nonetheless, this study carries both theoretical and practical importance, contributing to healthcare literature in Saudi Arabia and offering insights to decision-makers in enhancing mHealth utilization and eHealth technology adoption. Recommendations include involving users in app design and development and conducting continuous evaluations to meet evolving user needs.

In conclusion, this research advances knowledge on Health app utilization in the healthcare sector. Its findings underscore the significance of user awareness, ease of use, satisfaction, and demographic factors in shaping Health app adoption and effectiveness. The study's insights can inform healthcare providers, policymakers, and app developers in optimizing functionality, accessibility, and user experience, ultimately leading to improved healthcare service delivery and patient outcomes.

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Informed consent: All participants were informed about the study's purpose, and informed consent was obtained.

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