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Digital Health in Saudi Arabia: A Descriptive Study of User Perspectives, Adoption Rates, Benefits, and Challenges of Digital Health Applications

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Digital Health in Saudi Arabia: A Descriptive Study of User Perspectives, Adoption Rates, Benefits, and Challenges of Digital Health Applications

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***Abstract*—Background: Digital health applications have emerged as transformative tools within healthcare systems globally. This study investigates the perceptions, adoption, perceived benefits and challenges, and factors involved in the selection of digital health apps among the residents of Riyadh city, Saudi Arabia.**

Methodology: A cross-sectional study was conducted using a validated, self-administered online questionnaire targeting residents of Riyadh aged 18 years and older. A total of 444 participants were recruited through convenience sampling via social media platforms.

Results: Among the respondents, 90% reported using digital health applications, with *Sehhaty* being the most commonly used. Over 75% rated these applications as effective in improving quality of life (QoL). Key benefits included improved healthcare access, appointment booking, health awareness, and time efficiency. Fitness tracking was the most used app category (57.2%). Despite positive perceptions, 22% reported challenges, including technical difficulties and limited app compatibility. Ease of use was the most important factor (92.1%) when choosing a health app.

Conclusion: Digital health applications have been widely adopted in Riyadh and are perceived to enhance QoL through improved access, convenience, and personal health management. The findings highlight strong user satisfaction and a growing interest in preventive care. Expanding digital health features, enhancing awareness, and integrating AI-based tools are recommended to further support health outcomes and national digital health goals.

***Index Terms*— Attitudes; Health Knowledge; Mobile Applications; Practice; Quality of Life; Saudia Arabia; Telemedicine.**

I. INTRODUCTION

Digital health refers to the use of digital technologies to improve health and healthcare services. It includes tools such as mobile applications and telemedicine, which are designed to support better health outcomes and healthcare delivery. As these technologies increasingly integrate into individuals' daily lives and healthcare experiences, their relevance to broader health concepts becomes more apparent. Quality of life (QoL) is defined by the World Health Organization (WHO) as "an individual's perception of their position in life in the context of the culture and value systems in which they live and to their goals, expectations, standards and concerns" [1,2]. Recognising the significance of enhancing QoL, Saudi Arabia launched the Quality of Life Program (QOLP) in 2018 as part of its Vision 2030 initiative. This program aims to improve liveability and lifestyle, foster economic growth, and expand recreational, cultural, and healthcare opportunities [3]. A key component of this national transformation is the integration of digital health technologies, which play a crucial role in enhancing healthcare accessibility and efficiency. The Saudi Ministry of Health has actively promoted digital health solutions, aligning with Vision 2030's goal of developing a technologically advanced healthcare system [4]. In recent years, Saudi Arabia has seen an increase in the adoption of digital health applications, including *Sehhaty*, *Tawakkalna*, *Mawid*, and *Wasfaty*. These platforms have transformed healthcare delivery by providing virtual consultations, telehealth services, remote

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patient monitoring, appointment scheduling, health tracking, and other related digital health services [4]. One of the country's most widely used health apps is *Sehhaty*, serving over 31 million users, enabling 51 million appointments, and offering instant virtual consultations [5]. The widespread adoption of these applications has significantly improved access to healthcare and reduced the need for physical hospital visits. They have also improved physical activity and function in individuals with chronic conditions [6].

The COVID-19 pandemic served as a turning point for digital health globally, and particularly in Saudi Arabia, accelerating the adoption of various digital healthcare solutions [7]. One of the most notable advancements in Saudi Arabia was the launch of the Seha Virtual Hospital, the largest of its kind globally, connecting 130 traditional hospitals to provide remote healthcare services [8]. On a global scale, too, the significance of digital health technologies has been increasingly recognised. For instance, the World Health Organization's Global Strategy on Digital Health highlights the strategic role of digital technologies in accelerating progress towards the health-related Sustainable Development Goals (SDGs) and achieving Universal Health Coverage (UHC). It emphasises that the innovative use of digital tools such as artificial intelligence (AI), remote monitoring, big data analytics, and mobile platforms is essential to improve diagnosis, treatment decisions, self-management of care, and overall health outcomes [9]. The State of Digital Health 2023 report revealed that digital health solutions are now widely adopted across 67 countries, with major investments in telemedicine, wearable health devices, and AI-powered diagnostics [10]. Despite the rapid expansion of digital health, however, challenges persist.

While digital health apps have demonstrated transformative potential to improve healthcare accessibility and patient engagement, there remains a significant gap in research specifically examining the associated perceptions, benefits and challenges. To date, limited studies have explored the intersection of digital health and QoL in Saudi Arabia, leaving room for further investigation. This study has two primary objectives: (i) to assess the perceptions, usage patterns, and measurable benefits and challenges of digital health technologies, and (ii) to provide evidence-based recommendations for policymakers, healthcare professionals, and technology developers to optimise digital health solutions for improved health outcomes and user experiences.

II. METHODS

Study Design, Study Population, and Sampling

To ensure accurate and reliable data collection for this study, this cross-sectional study employed a convenience sampling method and an online questionnaire that was developed and validated for the study. The target population was Riyadh residents aged 18 years and over. Riyadh being selected for its central role in digital health adoption, advanced healthcare infrastructure, and diverse population. As the capital and most densely populated city in Saudi Arabia, Riyadh provides a relevant setting for examining digital health usage.

Data Collection and Survey Instrument

A self-administered, online questionnaire was used to collect data between March 13 and April 23, 2024, its development based on the current state of digital health in Saudi Arabia and supported by relevant literature reviews. It was reviewed and approved by experts employed in public health settings or serving as university faculty members in the community health department. The questionnaire assessed the perceptions, adoption, and perceived benefits and challenges of digital health applications in Saudi Arabia. A convenience sampling method was employed to facilitate easy access to the target population, and the survey was distributed through popular social media platforms, including WhatsApp, LinkedIn, and X (formerly Twitter). The instrument was designed to capture comprehensive data across multiple domains relevant to digital health usage and its perceived effects.

The questionnaire consisted of four main sections: sociodemographic characteristics, use of digital health apps, participants' evaluation of digital health apps, and perceived benefits and challenges. The first section collected demographic information including the participants' gender, age, nationality, and employment status. The second section examined the use of digital health apps, inquiring whether participants had used such apps and, if so, which types they used most frequently. The apps considered included fitness tracking apps, virtual clinic apps, medication reminder apps, sleep quality monitoring apps, mental health booster apps, and nutrition monitoring apps. To assess user perceptions and experiences, the third section

measured participants' evaluation of digital health apps across three dimensions: effectiveness, difficulty, and perceived support. These aspects were rated using a five-point Likert scale. For effectiveness, participants rated how well the apps improved their quality of life, ranging from 'Not effective at all' (1) to 'Always effective' (5). Difficulty was assessed according to participants' perceived ease difficulty or ease of use, with responses ranging from 'I always find it difficult' (1) to 'I have no difficulty at all' (5). Lastly, perceived support for digital health apps provided in Saudi Arabia was rated from 'Not supportive at all' (1) to 'Very supportive' (5). The fourth section addressed the perceived benefits and challenges associated with digital health apps. Participants identified various benefits, including improved fitness levels, increased health awareness, stress reduction, better adherence to dietary plans, time efficiency, and enhanced access to healthcare services. Conversely, challenges such as usage difficulties, time constraints, technical issues, lack of app interconnectivity, and device compatibility problems were also reported. Furthermore, we assessed the participants' level of agreement with various statements about digital health apps to gain deeper insights into their perceptions and future intentions regarding these technologies. The statements covered aspects such as the perceived contribution of digital health apps to healthcare improvement, their ability to meet users' needs, and participants' willingness to continue using and recommending them in the future.

Inclusion and Exclusion Criteria

Participants included in this study were required to be at least 18 years of age and residents of Riyadh, Saudi Arabia. Individuals who did not provide informed consent were excluded. After applying these criteria, four participants were excluded, resulting in a final sample size of 444 participants.

Validity and Reliability

To enhance the validity of our survey tool, we conducted a pilot test involving 27 participants who were subsequently excluded from the main study. The pilot study helped to identify any ambiguities in the survey's content or issues with functionality that may affect its relevance and accuracy. This approach confirmed the suitability of the tool for collecting the data required. Additionally, Cronbach's α was calculated to assess reliability, demonstrating strong internal consistency with a score of 0.83.

Data Analysis

Data analysis and visualisation were conducted using JMP PRO 18 and Microsoft Excel. The study focused on providing a descriptive overview of participants' responses, aiming to summarise key patterns and trends without examining statistical associations between variables.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) with approval number 25-418, and the study adhered to the ethical principles outlined in the Declaration of Helsinki. Participation was voluntary, and informed consent was obtained electronically before participants could proceed with the survey. The survey was conducted anonymously to ensure confidentiality and minimise social desirability bias. Participants were also informed that they could withdraw at any time without consequences. All data were stored securely, accessible only to authorised researchers, ensuring confidentiality and anonymity.

III. RESULTS

Sociodemographic Characteristics

A sample of 444 participants was selected for the study. The sample included an almost-equal distribution of men and women, with women comprising 52.93% (n = 235) of the total number. Most participants were between 18 and 25 years old (59.91%, n = 266), while the smallest age group was those older than 60 years (2.03%, n = 9). Most participants were Saudi citizens (95.72%, n = 425), with students representing the largest occupational group (51.58%, n = 229), followed by employees (28.38%, n = 126). Table 1 presents the participants' sociodemographic characteristics.

Use and Rating of Digital Health Apps

Table 2 illustrates the participants' ratings of digital health apps across three dimensions—effectiveness, difficulty, and support. The highest ratings were observed in the categories of effectiveness (52.48% rated 5, n = 233) and support (72.52% rated 5, n = 322). Regarding difficulty, most participants reported having no difficulty at all (42.12%, n = 187), followed by 'I have no difficulty' (22.30%, n = 99) and 'neutral' (20.27%, n=90). Figure 4 shows that most participants (89.9%, n = 399) reported using digital health apps, while only 10.1% (n=45) reported not using any.

Agreement with Digital Health Statements

Participants expressed varying levels of agreement with statements related to digital health apps, as

shown in Table 3. The highest level of strong agreement was with the statement, 'I will use digital health apps in the future,' indicated by 71.17% (n=316) of respondents. This was followed by 67.57% (n=300) who indicated that they would recommend health apps to friends and family. The greatest disagreement was seen in response to the statement, 'I use digital health applications' with 13.51% (n=60) disagreeing and 7.88% (n=35) strongly disagreeing. Meanwhile, only 36.49% (n=162) strongly agreed and 18.47% (n=82) agreed that they had noticed an improvement in their quality of life after using healthcare apps.

Most Used Digital Health Apps

The most-used digital health apps among participants are illustrated in Figure 1. Fitness tracking apps were the most commonly reported (57.2%, n = 254), followed by virtual clinic apps (13.7%, n = 61). Sleep quality monitoring apps were the least used, with only 2% (n=9) of participants reporting their use.

Perceived Benefits and Challenges

Participants' perceptions of the benefits and difficulties associated with digital health apps are shown in Figure 2. The majority (97%, n = 431) experienced benefits, while 78% (n=346) stated that they did not face difficulties when using digital health apps. Conversely, 22% (n=98) reported experiencing challenges.

The specific benefits and challenges perceived by participants are detailed in Table 4. The most frequently reported benefit was easy appointment booking (17.90%, n = 314), while medication reminders were the least reported benefit (0.57%, n = 10). Most participants (77.93%, n = 346) indicated that they did not face any challenges, with difficulty of use being the most commonly cited issue (9.91%, n = 44).

Important Factors When Choosing Digital Health Apps

The most important factors considered by participants when selecting digital health apps are presented in Figure 3. Ease of use was identified as the most important factor (92.10%, n = 409), while availability of technical support and attractive design were the least important, both reported by only 0.90% (n=4) of participants.

IV. DISCUSSION

This study investigated the perceptions, adoption, benefits and challenges, and factors considered in the selection of digital health applications in Saudi Arabia. The widespread adoption of digital health is evident, as demonstrated by the high usage rates, highlighting its increasing role in enhancing overall well-being. Our research indicates a 90% (n=499) adoption rate, with over 75% (n=335) of participants asserting that digital health apps improve quality of life. These findings align with previous research highlighting the value of digital health in supporting healthcare services. For instance, Mohamed et al. reported that 58.8% (total n = 323) of participants perceived digital health as a valuable resource for patient care [11]. Additionally, AlAli et al. [12] reported that approximately 53.4% (n = 393) of participants expressed general awareness of digital health applications. The widespread adoption of digital health apps in Saudi Arabia is largely driven by government-led initiatives. For instance, during the COVID-19 pandemic, Alharbi and Almufarij found that *Tawakkalna* (96.0%) and *Tabaud* (68.6%) (total n = 878) were the most widely used applications, reflecting the urgent need for contact tracing and pandemic management tools [13]. More recently, however, digital health priorities have shifted from emergency pandemic response to broader, long-term health service delivery. Unlike *Tawakkalna* and Tabaud, which were designed for crisis response, *Sehhaty* and similar platforms such as *Mawid*, Seha Virtual Hospital, and *Wasfaty* now focus on appointment booking, telemedicine, and medication prescriptions, in line with the digital transformation goals of Saudi Arabia's Vision 2030. This reflects the growing desire among Saudi citizens to utilise digital health apps to improve their health and well-being.

One of the key benefits identified in this study was the role of digital health apps in promoting physical activity, with improved fitness levels identified as the primary benefit of using health apps (48.7%, n = 216). There is a crucial role for digital health in this domain, particularly as Saudi Arabia faces rising obesity rates. There has been significant adoption of fitness tracking apps, with a usage rate of 57.2% (n = 254) in the present study. This data implies that users are actively engaging with tools to monitor their fitness and activity levels. A study by Al-Ansari et al revealed that approximately 80% (total n = 195) of users believed that their fitness app could enhance their awareness of their physical activity [14], while further evidence suggests that

digital health technologies can significantly improve obesity management and promote overall well-being [15].

Another key impact of digital health on QoL is its role in improving general health outcomes. In this study, 63% (n = 281) of participants agreed that these apps helped to improve their general health. This broadly positive perception of digital health services aligns with the increasing reliance on digital health for self-care and health management. Similarly, Mohamed et al. found that 70.9% (total n = 323) of participants agreed that digital health apps could be used effectively to monitor patients with chronic diseases, further supporting their utility in improving health in general [11]. Likewise, on a global scale, previous research has demonstrated positive outcomes associated with digital health interventions across various health conditions. Boulley et al. reported improved well-being among breast cancer survivors using digital health interventions [16], while Howarth found that digital health interventions contributed to better health-related outcomes among workplace employees [17]. Furthermore, systematic reviews have confirmed that digital health interventions may provide clinical benefits in managing musculoskeletal conditions and significantly improve HbA1c among diabetes patients, compared with the usual care [18,19]. The consistent positive outcomes reported in different diseases by various studies, alongside the high level of agreement observed in this research, highlight the expanding role of digital health applications across diverse medical conditions.

Ease of access to healthcare services was another prominent benefit reported by our participants, where many users appreciated the convenience of booking appointments and accessing services digitally. This aligns with a previous study in which participants reported that the digital health app Seha enhanced their ability to obtain healthcare services and enhanced service delivery [20]. These findings suggest that digital health applications enhance convenience and accessibility, ultimately increasing the likelihood of individuals taking proactive steps towards managing their health. A significant factor contributing to the adoption of digital health is its user-friendly quality. In this research, 77.9% (n = 346) of participants reported experiencing no challenges, and 65% (n = 286) encountered no difficulties while using digital health apps. This is in agreement with the results of another study, which also indicated that 65% (total n = 736) of respondents faced no obstacles when utilising medical apps on their devices [12]. In this study, around 60% (n = 266) of participants were aged between 18 and 25, implying that a digitally proficient demographic may experience fewer challenges in embracing and using digital health solutions. Moreover, 51% of the Saudi population is under 29 years old, suggesting that the general population is unlikely to face significant hurdles in adopting digital health technologies [21].

This study confirms that digital health apps can enhance quality of life by improving healthcare access, self-care, and disease management. High adoption rates in Saudi Arabia, driven by government initiatives and digital literacy, reflect a growing reliance on these technologies. Key benefits include easier appointment booking, time efficiency, and improved healthcare accessibility. Digital health represents the future of healthcare and well-being, particularly with the integration of artificial intelligence (AI) and emerging digital health technologies; as advancements continue, it has the potential to significantly reduce the burden of chronic diseases by improving early detection and continuous monitoring.

While this study provides valuable insights into the quality-of-life benefits of digital health apps, certain limitations should be acknowledged. One key limitation is the limited regional scope: as the study focuses only on Riyadh, it may be difficult to generalise the findings to other rural or urban areas of Saudi Arabia. Another limitation is the overrepresentation of younger participants (18–25 years), students (51.6%), and Saudi nationals (95.7%), which may limit the generalisability of the findings to more diverse populations. Similarly, the occupational background of participants is skewed, with 51% being students, which may influence perceptions and usage patterns. Moreover, the use of convenience sampling limits the ability to generalise the findings to the broader Saudi population, as the sample may not fully represent individuals with different levels of digital health literacy or healthcare access, as an online survey was used (indicating that everyone who participated had a mobile phone). Furthermore, the study's cross-sectional design (utilising a survey instrument) restricts the ability to determine causal relationships between digital health application usage and improvements in quality of life. Finally, the reliance

on self-reported data might introduce potential biases, such as recall bias and response bias, which may affect the accuracy of participants' responses.

Recommendations and Implications for Future Research

The majority of participants in this study reported no difficulties using digital health apps; however, a small percentage (22%) reported challenges. To gain deeper insights into the factors contributing to these difficulties, further research might be conducted to identify specific barriers. Understanding these obstacles would allow for the development of more targeted solutions to improve accessibility and user experience. Therefore, a recommendation for future research is to adopt qualitative methods, such as interviews or focus groups, to gain deeper insights into community perspectives and to explore the underlying relationships between digital health use and quality of life.

The participants expressed a need for increased knowledge and awareness regarding health-related topics. To address this, the *Sehhaty* app could incorporate more features with a specific focus on expanding health awareness, and following a personalised approach could significantly enhance its impact. For instance, a feature that delivers condition-specific educational content based on a user's medical history would enable individuals to access relevant health information tailored to their specific needs. This enhancement would not only improve user engagement but also empower individuals with knowledge about their health conditions, promoting proactive health management and informed decision-making. Additionally, a comprehensive dashboard accessible to both patients and healthcare providers could facilitate improved follow-up, medication adherence, and treatment optimisation.

V. CONCLUSION

This study demonstrates the significant role of digital health apps in enhancing quality of life among residents of Riyadh, Saudi Arabia. The high adoption rate and positive perceptions of digital health highlight its potential for improving healthcare accessibility, efficiency, and self-management of health. Key findings include substantial user satisfaction regarding ease of use, effectiveness in health improvement, and convenient healthcare access. However, challenges such as awareness gaps and usability issues remain among a minority of users, indicating areas for further improvement. Future efforts should focus on personalised health education features within popular platforms such as *Sehhaty*, to maximise benefits. Overall, digital health technologies represent essential tools for empowering individuals and improving health outcomes in Saudi Arabia.

VI. AVAILABILITY OF DATA AND MATERIALS

The data sets used in this study are available from the corresponding author and will be provided upon reasonable request.

VII. CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Table 1. Sociodemographic characteristics of study participants (N= 444)

CHARACTERISTIC	N	%
GENDER		
Female	235	52.93 %
Male	209	47.07 %
AGE (YEARS)		
18-25	266	59.91 %
26-35	59	13.29 %
36-45	55	12.39 %
46-60	55	12.39 %
Over 60	9	2.03%
NATIONALITY		
Saudi	425	95.72 %
Other	19	4.28%
OCCUPATIONAL STATUS		
Student	229	51.58 %
Employee	126	28.38 %
Unemployed	52	11.71 %
Retired	25	5.63%
Self-employed	12	2.70%

Table 2. Participants' rating of digital health apps across effectiveness, difficulty, and support

Question	N	%
How effective do you think digital health applications are in improving quality of life?		
5 - Always effective	233	52.48%
4 - Effective	102	22.97%
3 - Neutral	85	19.14%
2 - Not effective	16	3.60%
1 - Not effective at all	8	1.80%
How would you rate the use of digital health applications in terms of difficulty?		
5 - I have no difficulty at all	187	42.12%
4 - I have no difficulty	99	22.30%

3 - Neutral	90	20.27%
2 - I find it difficult	40	9.01%
1 - I always find it difficult	28	6.31%
How would you rate the support for digital health applications in Saudi Arabia?		
5 - Very supportive	322	72.52%
4 - Supportive	69	15.54%
3 - Neutral	35	7.88%
2 - Not supportive	10	2.25%
1 - Not supportive at all	8	1.80%

Table 3. Participants' agreement with statements about digital health

Question	**5 Strongly agree**		**4 Agree**		**3 Neutral**		**2 Disagree**		**1 Strongly disagree**	
	N	%	N	%	N	%	N	%	N	%
I use digital health apps.	159	35.81 %	63	14.19 %	127	28.60 %	60	13.51 %	35	7.88 %
Digital health apps help improve the quality of healthcare in Saudi Arabia.	267	60.14 %	95	21.40 %	52	11.71 %	19	4.28 %	11	2.48 %
Digital health apps meet my needs.	210	47.30 %	103	23.20 %	84	18.92 %	39	8.78 %	8	1.80 %
I will use digital health apps in the future.	316	71.17 %	67	15.09 %	42	9.46 %	11	2.48 %	8	1.80 %
I will recommend health apps to my friends and family.	300	67.57 %	67	15.09 %	52	11.71 %	13	2.93 %	12	2.70 %
Digital health apps have contributed to improving my health in general.	179	40.32 %	102	22.97 %	98	22.07 %	43	9.68 %	22	4.95 %
Digital health apps have helped improve my decisions.	175	39.41 %	94	21.17 %	99	22.30 %	49	11.04 %	27	6.08 %
I have noticed an improvement in my quality of life after using healthcare apps.	162	36.49 %	82	18.47 %	119	26.80 %	47	10.59 %	34	7.66 %
Digital health apps have contributed to improving the quality of my life.	169	38.06 %	98	22.07 %	115	25.90 %	32	7.20 %	30	6.76 %

Table 4. Participants' perceived benefits and challenges of using digital health apps

Answers	**N**	**%**
What benefits have you noticed from using digital health apps?		
Improved fitness level	216	12.31%
Improved sleep quality	117	6.67%

Increased health awareness	270	15.39%
Reduced stress and anxiety	137	7.81%
Following diet	144	8.21%
Medication reminder	10	0.57%
Saving time and effort	270	15.39%
Easy appointment booking	314	17.90%
Easy access to healthcare	260	14.82%
Did not mention	16	0.91%
Total	1754	100.00%
What challenges have you faced while using digital health app?		
Difficulty of use	44	9.91%
Time constraints	16	3.60%
Technical problems	27	6.08%
Lack of interconnection between applications	3	0.68%
Lack of updates	4	0.90%
Compatibility issues with devices	4	0.90%
None	346	77.93%
Total	444	100.00%

Note: For these questions, participants could select more than one option. The totals reflect the number of responses, not the number of participants.

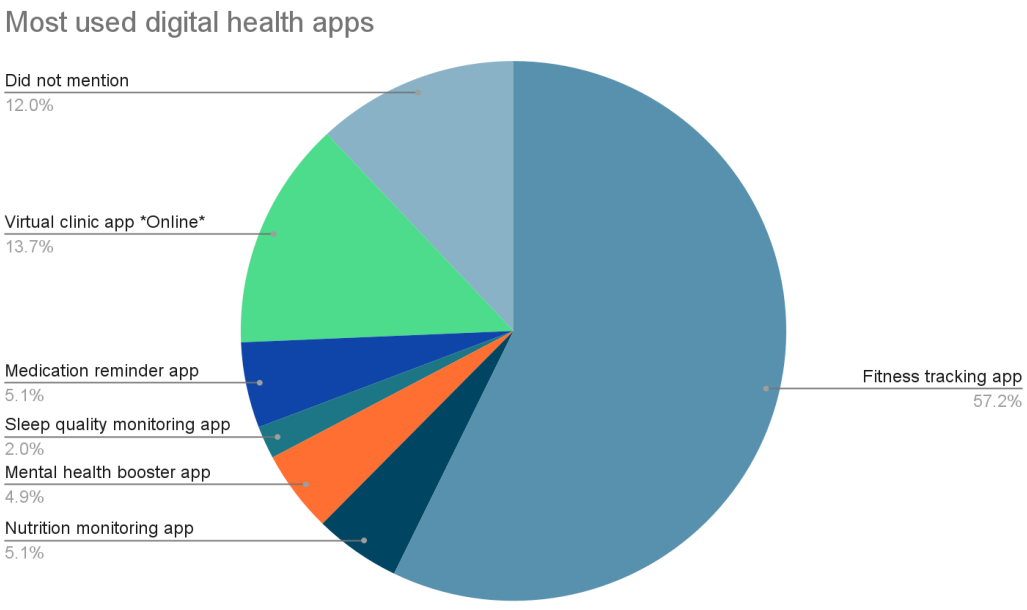

Figure 1. Most-used digital health apps

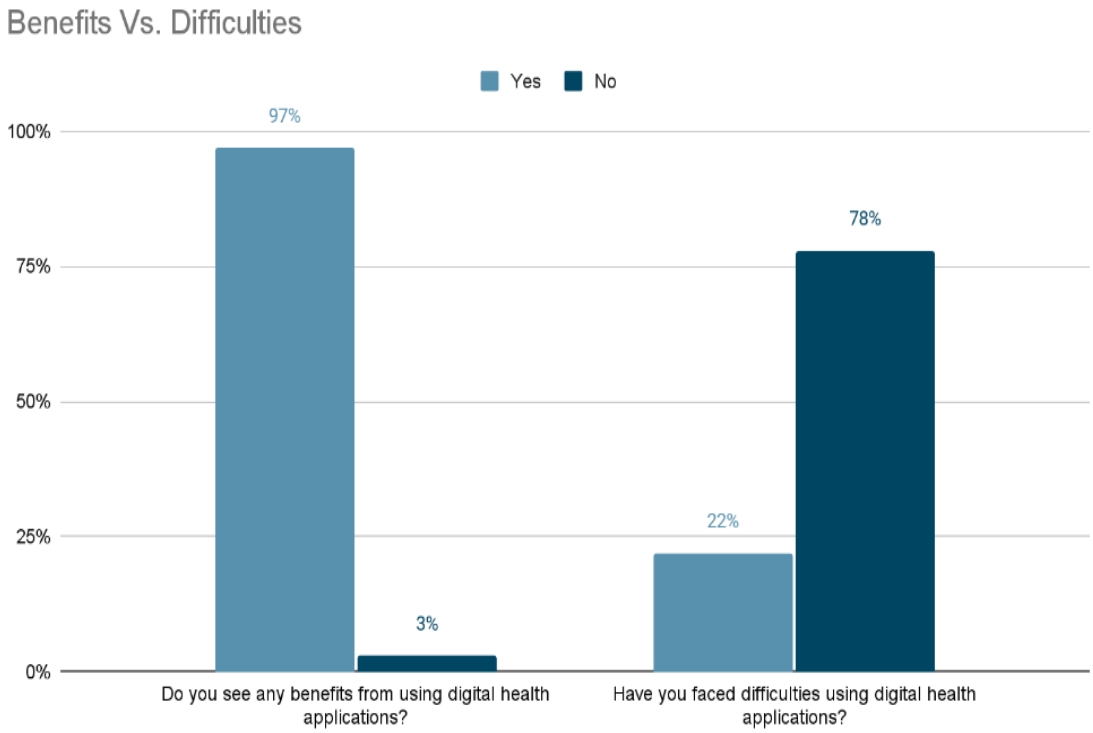

Figure 2. Participants' perceived benefits vs. difficulties regarding digital health apps

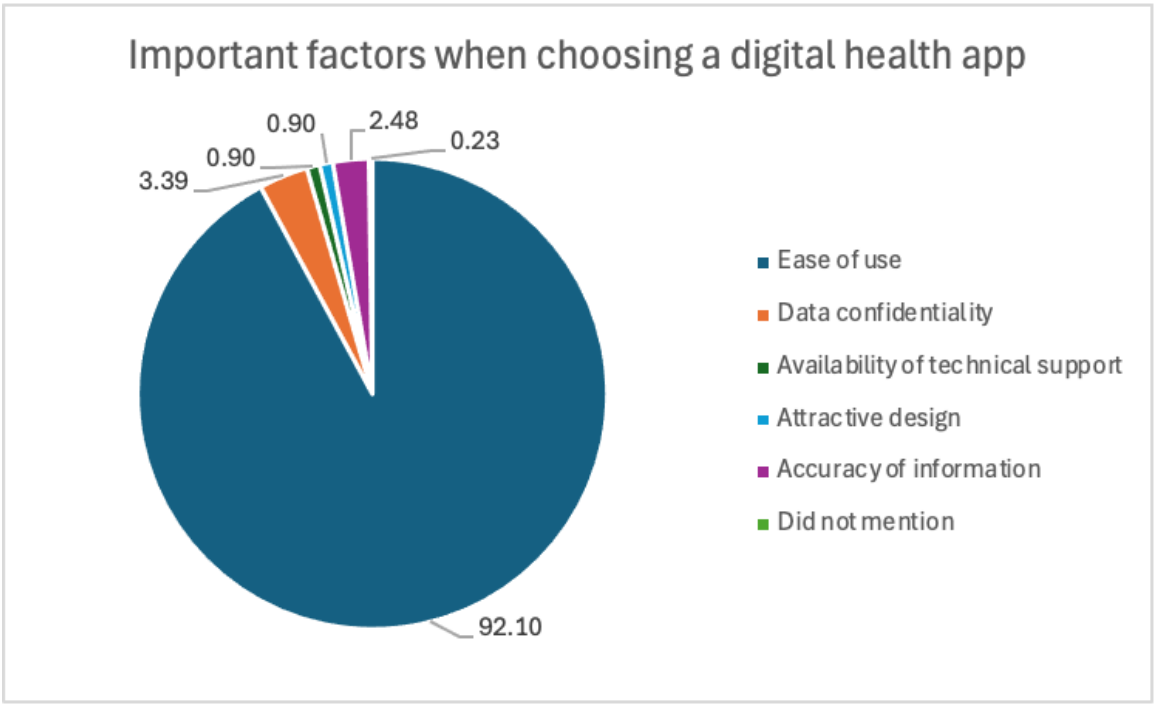

Figure 3. Important factors to consider when choosing digital health apps

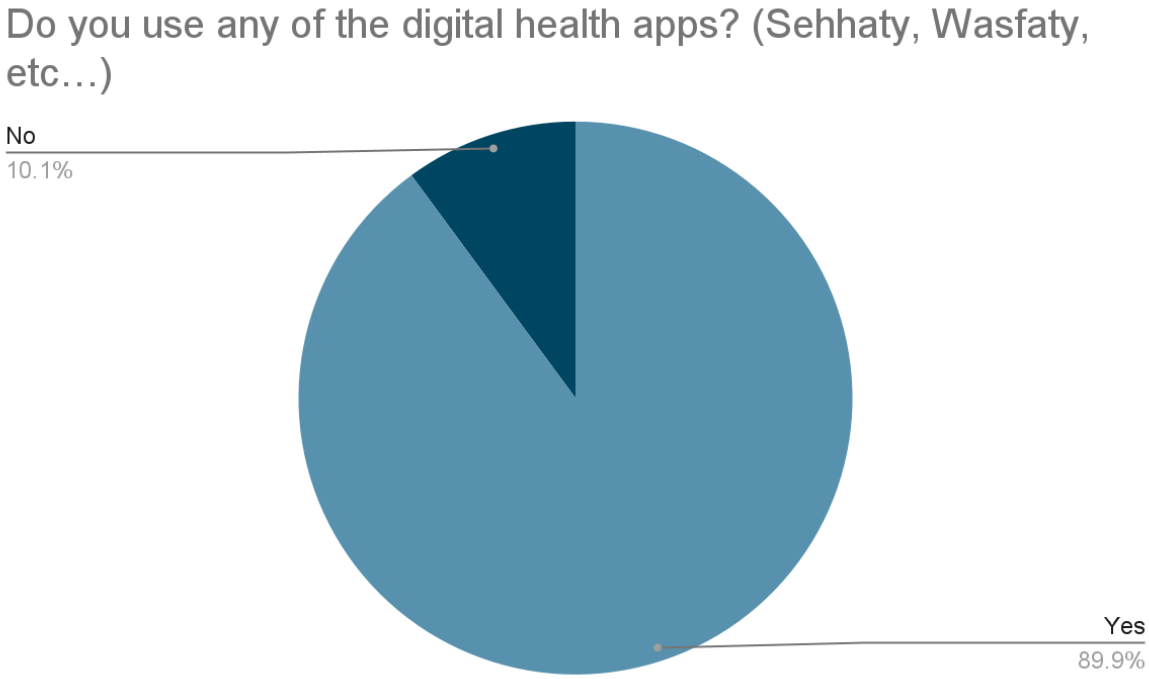

Figure 4. Use of digital health apps among participants