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Mobile Apps as Health-Supporting Tools in the Digital Era – Technological, Health, and Social Aspects of m-Health

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Abstract

Aim: The aim of this article was to provide a comprehensive review of the technological, health, and social aspects of using m-Health apps. The article examines the potential benefits and challenges associated with their implementation and highlights future research directions to facilitate the effective integration of these technologies into the healthcare system.

Methodology: A literature review was employed as the primary research method. Publications and reports concerning the rapid development of mobile technologies were analyzed, particularly emphasizing the increasing number of applications supporting health monitoring and daily healthcare.

Results: The analysis revealed that, with technological progress, mobile devices have become an integral part of daily life, contributing to a significant increase in mobile applications, including m-Health apps. These applications are gaining popularity due to their capabilities in monitoring health parameters and supporting preventive measures. It was also found that many of these applications remain underdeveloped despite the dynamic market growth, and their quality is not sufficiently validated.

Implications and recommendations: The study's findings indicate an urgent need to implement more rigorous standards for the evaluation and validation of m-Health applications, as well as to intensify research on the integration of digital technologies with the healthcare system to ensure their effectiveness, safety, and functional personalization.

Originality/value: This work constitutes an original contribution to the field of digital health by providing a comprehensive synthesis of technological, health, and social issues related to m-Health applications. The article identifies key gaps in the quality and validation of these tools while outlining directions for future research and recommending practical solutions for more effective integration of mobile technologies into the healthcare system.

Keywords: m-Health, mobile apps, health monitoring, healthcare system, health technologies

1. Introduction

The rapid technological development since the beginning of this century has been remarkable. It is difficult to imagine a person without a smartphone or tablet today, as these devices have become integral to daily life. Alongside the evolution from basic cell phones to smartphones, the growth of mobile apps has marked a significant shift, embedding them deeply into human routines. App stores offer various categories with numerous apps catering to diverse user needs, such as communication apps that facilitate global connections. Mobile apps also encompass entertainment, such as games and streaming platforms, and navigation tools that aid travel and transportation services. The 21st century has also witnessed increased attention to healthy living, turning mobile devices, particularly smartphones, into essential tools for maintaining daily health. Users can track physical activity, monitor sleep quality and heart rate, and receive reminders for medical check-ups. Consequently, there has been a notable rise in the popularity of m-Health (mobile health) applications. Developers compete to create solutions tailored to specific groups, such as persons with food allergies and pregnant women, making everyday health management more accessible.

The choice of this article's topic stems from the relevance and importance of these issues in today's world, where technology ubiquitously influences people's lives. The expanding domain of apps, particularly in healthcare (m-Health), is gaining significant attention. However, despite the rapid growth of the app market, the quality of many remains unchecked and requires improvement.

The aim of this article was to gather and organise knowledge about the technological, health, and social aspects of using m-Health applications. Literature review was used as the research method. The study could be helpful for scientists, doctors, and public health specialists to better understand the benefits and risks, outline key research directions, and support the effective implementation and optimisation of these technologies within the healthcare system.

2. Mobile Apps, Definition and Underdeveloped Application

Modern information technologies are an integral part of economic development today. Conducting any business activity without incorporating these technologies is nearly impossible. One of the most popular types is mobile technology, valued for its capability to be used anytime and anywhere (Pawełoszek-Korek, 2009). Mobile technology focuses on developing products designed for use on the go. Significant advantages of these products include:

- Ubiquity, allowing communication, access to current information, and various transactions from any location at any time.
- Personalisation, enabling apps to be tailored to the needs and interests of users, although it requires careful selection of processed content.
- Flexibility allows users to decide when to access and use these products.
- Localisation, helping users discover local events and read relevant news.

A mobile app is a program designed for mobile devices such as smartphones and tablets. Some apps come pre-installed as integral components of a device's operating system, while others can be downloaded according to user preferences and needs. Mobile apps are part of daily life and serve various purposes: work, learning, entertainment, communication, and payments, among others. One of the challenges in developing new apps is the need to adapt them to the wide variety of mobile devices available on the market. One example of an application that struggled with adaptation issues across different devices in the past is Facebook's Android app during its early development stages. Initially, users reported various challenges, such as slow performance, frequent crashes, and an interface poorly suited to different screen resolutions and device specifications. These issues stemmed from the fragmentation of the Android ecosystem, where the diversity of devices, operating system versions, and technical parameters posed a significant challenge for developers striving to ensure broad compatibility (Chong, 2013; Gan, 2018).

In the face of the rapid technological development of the modern world, the diversity of mobile apps is extensive. Users can choose from many options across virtually every field and industry. There are also various ways to classify these apps, with the most commonly used categories including:

- social and communication apps,
- financial and banking apps,
- educational apps,
- entertainment apps,
- health apps (m-Health),
- navigation apps,
- shopping apps (online and in-store),
- streaming apps.

The era of mobile apps is considered to have begun on 9 January 2007, when Steve Jobs introduced the first iPhone. While essential mobile apps had existed before, the launch of the iPhone marked a turning point for the dynamic development of the app market. The following year saw the launch of the App Store, a digital distribution platform for iPhone apps. A few months later, Google released its smartphone and the Android Market (now Google Play), an equivalent of the Android system (Gan, 2018; Ratalewska, 2017).

In addition to meeting user needs, mobile apps can be used as tools for mobile marketing. According to the definition formulated by the Mobile Marketing Association, mobile marketing encompasses activities that enable communication and collaboration with target audiences via mobile devices or the Internet (Mobile Marketing Association, 2009). Sznajder (2014) argued that mobile marketing involves creating products that require appropriate pricing, promotion, and distribution through mobile apps. Scharl et al. (2005) viewed it as using wireless channels to deliver information that promotes products, services, and ideas, personalised for specific users, and benefiting both parties.

Scientific reports indicate that mobile marketing positively influences consumer choices, and enjoys increased popularity and user interest, as consumers are more willing to view ads, use mobile-exclusive discount vouchers, and make payments through banking apps. Mobile apps continue to modernise mobile marketing. With the growing popularity of mobile apps, companies often create their own, boosting competitiveness and enhancing reputation. An attractive, intuitive app is a significant asset, showcasing modernity and user-centric design, which can increase customer numbers (Jain & Viswanathan, 2015; Jasiulewicz, 2015).

Many people cannot imagine using mobile versions of websites without mobile apps, due to their greater convenience and efficiency. This trend is particularly evident among Generation Y (born between 1980-2000) and younger groups who are more open to new technologies than older generations (Bhave et al., 2013). Research by Rohm et al. (2012) pointed to young people as a key target group for current and future applications. This generation, termed Generation M (the mobile generation), includes those born from the 1990s, when Internet access became widespread in Poland. Young users of Generation M, known as "consumers of the future," prompt businesses to tailor their offerings to meet their needs and preferences (Jain & Viswanathan, 2015; Jasiulewicz, 2015).

The interests and needs of mobile app users vary significantly due to factors such as age, education level, gender, occupation, financial status, and place of residence. This diversity reflects different consumer preferences, as confirmed by rankings compiled by AppMagic. This platform, which specialises in mobile app market analysis, is a valuable tool for quick and effective market research (Wang & Qi, 2021). Table 1 presents a ranking of the ten most frequently downloaded free apps in Poland and worldwide in 2022, based on data from this platform (AppMagic, 2023).

Table 1. Ranking the ten most popular free apps in Poland and worldwide in 2022

Place in the ranking	Poland (number of downloads)	World (number of downloads)
1.	Shopee (7 046 157)	TikTok (880 270 294)
2.	Biedronka (5 048 524)	Instagram (774 312 117)
3.	Vinted (5 030 477)	Facebook (650 333 864)
4.	Coin Master (3 956 810)	WhatsApp (482 556 168)
5.	TikTok (3 540 197)	Snapchat (429 692 309)
6.	WhatsApp (3 182 870)	Telegram (399 088 796)
7.	Reserved (2 979 100)	CapCut (361 468 135)
8.	Disney+ (2 867 396)	Messenger (340 502 770)
9.	Messenger (2 773 257)	Spotify (289 896 733)
10.	Stumble Guys (2 748 275)	WhatsApp Business (288 289 009)

Source: own study based on AppMagic, 2023.

3. M-Health Apps, Overview and Characteristics

M-health apps, also known as mobile health apps, support helping users manage their health, dietary habits, and physical activity. Their primary aim is to assist in maintaining a healthy lifestyle by providing easy access to health information and enabling users to track their progress. Popular devices such as smartphones, tablets, and smartwatches allow users to access these apps and store data locally, minimising the risk of data loss (Garavand et al., 2024; Jabour et al., 2021).

The market offers a wide range of m-Health apps, many of which are available for free, and enable users to create personalised nutrition plans, monitor calorie intake and hydration levels, access recipes, count daily steps, choose exercises tailored to their fitness levels, and track menstrual cycles. It is crucial, however, to remember that these apps serve as supportive tools and do not replace primary healthcare. In the event of health issues, consulting a physician is advised (OSOZ – Ogólnopolski System Ochrony Zdrowia, 2016; Wasserman et al., 2023).

In recent years, increased media coverage has raised public awareness about the benefits of a healthy lifestyle and the risks of neglecting proper nutrition. Research indicates that young people primarily source health information from the Internet. While most respondents find m-Health apps useful, only half use them regularly, mainly due to a lack of motivation for consistent data entry. Self-education is critical to effective app use (Baranek et al., 2017b).

Morańska (2007) stressed that intrinsic factors, particularly emotional and motivational, play a pivotal role in self-education, aiming to enhance cognitive processes, self-discipline, and commitment to achieving goals. Mobile apps offer extensive opportunities to support users' self-determination in promoting healthy lifestyles. Examples of motivation include tracking health progress, comparing results with other users, and reminders or congratulatory notifications, which increase app engagement and can contribute to improved health.

M-Health applications adapt to the needs of older adults, persons with disabilities, and those facing digital exclusion by offering user-friendly features like simple interfaces, large fonts, voice assistance, and offline capabilities. These adjustments make it easier to manage health tasks, such as tracking medications or scheduling appointments, even for users with limited technical skills or accessibility challenges. By enabling remote consultations and health monitoring, m-Health tools also bridge gaps in care for people in isolated areas or with mobility constraints. However, their impact depends on expanding access to education and technology infrastructure to ensure more equitable healthcare support (Wilson et al., 2021).

The m-Health category encompasses a variety of tools that support a healthy lifestyle, aiding users in daily activities that promote better health. However, the term ‘health apps’ is broad and includes many subcategories. Common types of health apps include fitness trackers, weight and nutrition management apps, health monitoring apps, and apps that remind users to complete specific health-related tasks (Bessin et al., 2020; Łosiak-Pilch, 2017).

3.1. Sports Apps

Sports applications, which track physical activity and motivate users to exercise, are most commonly used within m-Health. They assist in recording training progress, planning subsequent exercises, and monitoring results. Many of these apps offer GPS functionality, allowing runners, cyclists, and walkers to track their routes and receive data on time, calories burned, and average speed. Users can also share their results on social media, enhancing motivation. Additionally, apps provide home workout plans and facilitate collaboration with others for joint exercise sessions (Łosiak-Pilch, 2017). Sharing achievements fulfills the need for recognition and motivation, driving continued engagement in sports. Popular sports apps include: Ćwiczenia w Domu – bez sprzętu; Ćwiczenia dla kobiet, 30 Dni Fitness Wyzwanie w Domu; GPS Bieganie Chodzenie i Rower and Google Fit – Śledź aktywność (Łania & Pasławska, 2015).

3.2. Apps for Weight Management and Healthy Eating

Weight management apps often include BMI calculators which determine body mass index based on data like gender, age, height, and weight, allowing users to quickly assess whether their body weight is within a healthy range. Some apps estimate body fat percentage using body measurements, providing further insight into physical condition (Ghelani et al., 2020; Łosiak-Pilch, 2017).

Healthy eating, a foundation of a healthy lifestyle, is supported by numerous mobile apps which feature functions for calculating the caloric value of meals and scanning barcodes on food products. After scanning, users receive detailed nutritional and caloric information if the product is in the app's database. Some apps include a glycemic index calculator for consumed foods. Specialised apps for meticulous diet tracking allow meal logging and nutrient intake calculations. Regularly using such apps helps compare progress over time, boosting motivation to maintain health. Examples include Fitatu Licznik Kalorii i Dieta; Dziennik Wagi – BMI, tłuszcz; Kontroluj Swoją Masę Ciała. All the listed applications are free and available in Poland (Baranek et al., 2017a; Łosiak-Pilch, 2017; Scarry et al., 2022).

According to Hanras et al. (2024), apps for Weight Management and Healthy Eating can support healthy eating habits but also increase the risk of obsessive food-related behaviors. For individuals prone to eating disorders, such as orthorexia, these apps can reinforce excessive control over the quality and quantity of consumed foods, potentially leading to nutritional deficiencies and deteriorating mental health. Similar risks apply to those with anorexia or bulimia, where the pressure to count calories strictly may exacerbate the issue. Therefore, it is crucial to use such tools with caution and seek professional help if needed.

3.3. Health Monitoring Apps

Health monitoring apps provide a convenient way to observe physical parameters daily. Users can easily log measurement results or important health-related data. These apps collect data in one place, enabling quick sharing with doctors or others, and encourage users to pay more attention to their health by motivating them to input information regularly. Analysis of recorded data helps identify abnormalities, which can signal the need for action (Kajzer & Szlachetka, 2017). Monitoring various health parameters, such as heart rate, can be especially beneficial for individuals with blood pressure issues. Some apps remind diabetic users to check their blood sugar levels, storing results and creating reports for analysis relative to norms (Łosiak-Pilch, 2017). Menstrual calendar apps also see widespread use, enabling women to record cycle dates, body temperature, and other symptoms, aiding medical consultations. Pregnancy apps support monitoring pregnancy progress, storing ultrasound data, asking questions to the doctor, and providing developmental information by week. Examples include Indeks Glikemiczny. Cukrzyca; mySugr – Dzienniczek diabetyka; Monitor pracy serca: Pulsometr; Mój kalendarz miesiączkowy (Symul et al., 2019).

3.4. Apps for Reminders to Perform Health-Related Actions

In the category of m-Health apps, there are also those designed to remind users to perform specific actions for health maintenance. Examples include apps that remind users to take breaks, which is particularly useful for individuals spending at least half of their work time in front of a computer, leading to a forced body posture and static strain. These tools send notifications encouraging users to stand up, stretch, and reduce eye strain from exposure to blue light emitted by monitors (Łosiak-Pilch, 2017); also popular are apps that remind users to drink water regularly, helping to monitor daily fluid intake, such as Przypomnienie o wodzie and Work Rest: Focus Pomodoro Timer (Iribarren et al., 2021).

Advancements in mobile application technology also positively impact healthcare systems. Patients can independently enter information about symptoms or measurement results, which can be sent to doctors. This gives specialists more time for appointments without manually inputting data into the system, allowing for more precise and detailed examinations (Bąkała & Michalski, 2015).

4. Global Use of Mobile Apps in m-Health – Market Analysis

The COVID-19 pandemic highlighted the urgent need for practical digital tools. It accelerated the implementation of m-Health services, including remote consultations with general practitioners and specialists, electronic test result submissions, and e-prescriptions (WHO, 2021). Due to the growth of m-Health and the COVID-19 pandemic, platforms enabling doctor consultations without travelling to medical facilities conducted via video calls have become available (Smarżewska, 2018).

In recent years there has been a significant increase in scientific publications regarding mobile health apps, indicating a growing interest in this topic among users and researchers (Peng et al., 2020). The study by Marcolino et al. (2018) analysed 10,689 articles related to m-Health, of which 23 were systematic reviews. Seventeen of these reviews focused on studies from low and middle-income countries. The most common m-Health interventions included text messaging services for medication reminders, follow-up appointments, and health parameter monitoring, such as heart rate and glucose levels. These studies demonstrated that m-Health could improve health outcomes for patients with chronic diseases. For instance, there was a reduction in hospitalisations and improved expiratory volume for asthma patients, better glycemic control for diabetics, and blood pressure reduction for those with hypertension; moreover, overweight and obese patients saw weight reduction. However, evidence supporting m-Health's efficacy remains limited, and most studies have been conducted in high-income countries, suggesting that development of m-Health in lower-income regions is still in its early stages (Marcolino et al., 2018).

A 2009 World Health Organization study analysed global m-Health initiatives, and the results showed that many countries already offered services such as helplines, toll-free emergency numbers, and emergency services using mobile communication technologies. The chart below (Figure 1) illustrates the degree of m-Health program implementation across different regions. More advanced projects, such as medical decision-support systems, remain unavailable in developing countries. WHO also noted that evaluating the effectiveness of m-Health initiatives was not widely applied then (Gleason, 2015).

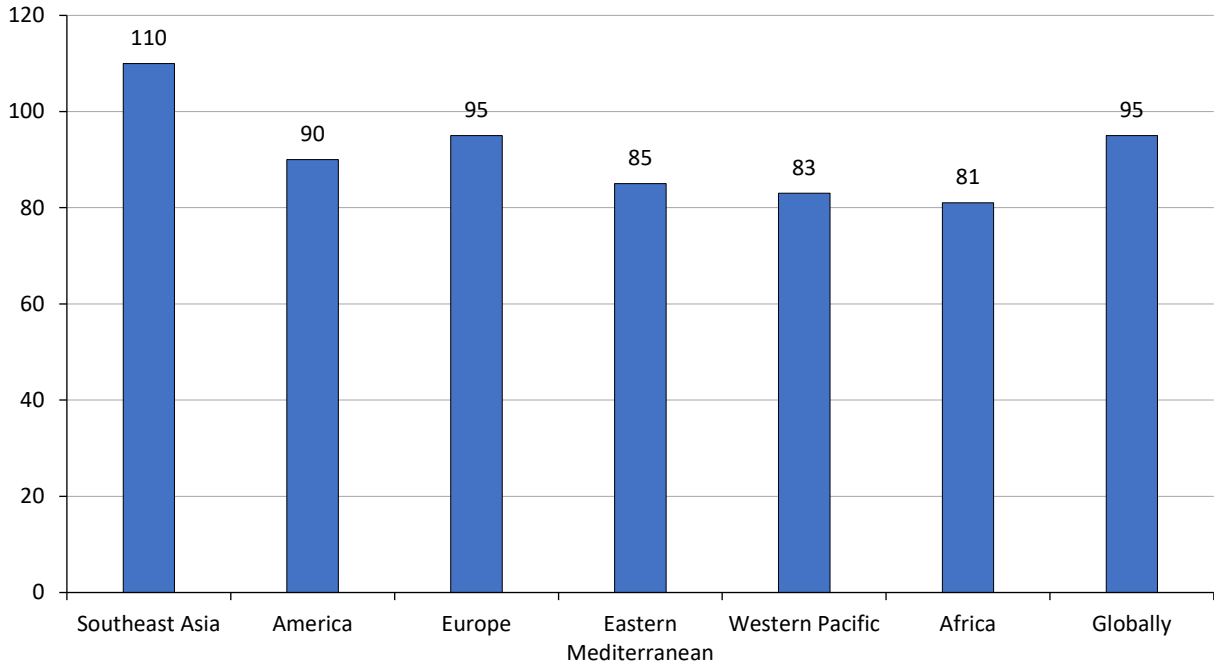

Fig. 1. WHO adoption of m-Health initiatives by region

Source: own study based on Gleason, 2015.

Since 2013 the mobile health apps market has been developing dynamically, with a steady increase in the number of available apps. In 2016, their number rose by 7% compared to 2015. This is evident in historical data from 2013 when users had access to approximately 97,000 health applications (Walters, 2014). Furthermore, the National Health Protection System report from 2017 indicated that approximately 260,000 apps were available on the market, offered by nearly 58,000 providers (Smarżewska, 2018).

It was projected that the global digital health market will reach expected revenues of 171.90 billion USD by the end of 2024. Forecasts also suggested that the market would have an annual growth rate (CAGR) of 8.49% between 2024 and 2029, leading to an estimated market value of 258.30 billion USD by 2029. The United States is predicted to generate the highest revenue globally (Statista, 2024).

From Figure 2 it can be inferred that the e-Health market, covering various aspects of healthcare and technology such as Digital Fitness & Well-Being, Digital Treatment & Care, and Online Doctor Consultations, is experiencing significant growth and offers numerous business opportunities worldwide. The global digital health market is seeing an increase in telemedicine adoption due to its accessibility and convenience during remote patient consultations (Statista, 2024).

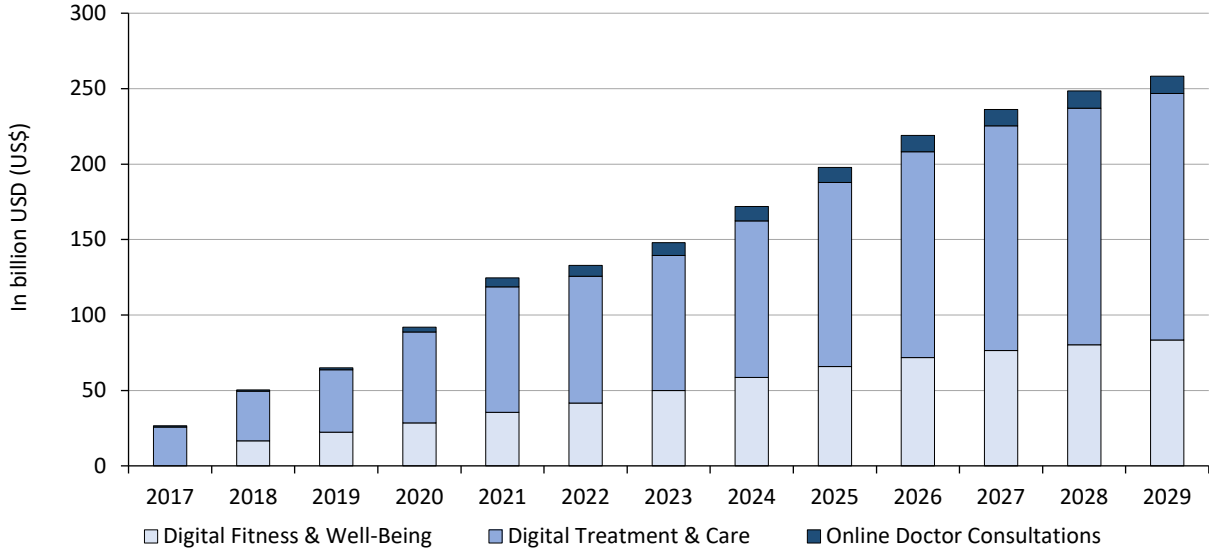

Fig. 2. Revenues in the m-Health segment

Source: own study based on Statista, 2024.

Between 2020 and 2022 there was an increase in revenue in the mobile apps and telemedicine sector, driven by the COVID-19 pandemic. Due to concerns about infection, consumers preferred staying home and remotely monitoring their health. According to a report by The Business Research Company analysing the m-Health apps market, the global value of health apps rose from 45.31 billion USD in 2022 to 56.77 billion USD in 2023, with an annual growth rate (CAGR) of 25.3%. Additionally, the Russia-Ukraine conflict disrupted the short-term economic growth post-pandemic, which caused economic shocks in Europe and globally, leading to price increases, supply chain issues, and inflation. According to the Healthcare Information and Management Systems Society, nearly 64% of American adults regularly use m-Health applications to monitor vital parameters (The Business Research Company, 2023).

It was estimated that in 2024 the global nutrition app market would achieve a revenue of 5.40 billion USD. The market is expected to grow at an annual rate (CAGR 2024-2029) of 11.12%, reaching a value of 9.15 billion USD by 2029. The predicted user penetration in 2024 was 4.40%, rising to 5.36% by 2029. India is projected to generate the highest revenue in the nutrition app market (Statista, 2024).

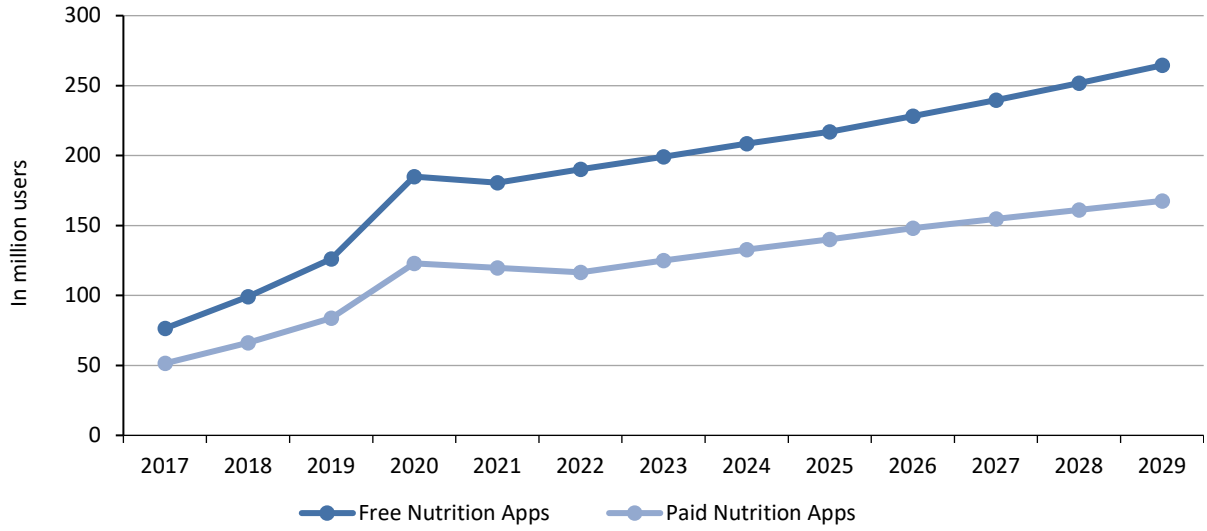

Fig. 3. Number of nutrition app users from 2017 to 2029

Source: own study based on Statista, 2024.

Figure 3, based on Statista Market Insights, compares the number of users of free and paid nutrition apps. Note that from 2019 to 2020 there was a significant increase in food app downloads driven by the global pandemic outbreak (Statista, 2024).

The growing popularity of mobile apps has dramatically influenced the development of the diet apps market. The rising interest in various diets and dietary restrictions has led to the creation of apps like HappyCow, which focuses on a vegan diet. More specialised apps are also increasingly available, providing users with tools to monitor their specific dietary needs. Data from the App Store and Google Play indicate that health and nutrition apps make up 3% of all those available. The increase in unauthorised apps intensifies competition in the market, putting pressure on key players. It is anticipated that the growing demand for more advanced features will lead to increased production costs for such apps. The COVID-19 pandemic underlined the importance of a healthy diet, resulting in an increased interest in nutrition, especially among remote workers aiming to counteract the effects of a sedentary lifestyle (Tang et al., 2024).

5. Barriers and Facilitators in the Use of m-Health Apps

The dynamic growth of the mobile apps and devices market is undeniable. Manufacturers from major companies such as Apple, Samsung, and Xiaomi introduce new generations of smartphones annually, offering users increasingly advanced features. These technological innovations enable the simultaneous development of mobile apps that utilise the advanced functions of devices.

Mobile Internet access and modern technologies, which often extend beyond the traditional IT sphere, provide benefits and support in daily activities, however they also encounter challenges related to their use and user expectations (Parys, 2016).

5.1. Barriers to Using m-Health Apps

Despite the wide range of health apps, their market faces numerous challenges. These issues can include difficulties with access, the complexity of application use, which may be too complicated for users, and the lack of device compatibility with application requirements. These barriers to using m-Health applications can be divided into several main categories (Table 2) (Smarżewska, 2018).

Table 2. Barriers to the use of m-Health apps, their description and characteristics

Barriers	Characteristics and description
Personal data protection	– lack of a precisely defined and developed process to oversee the certification of m-Health apps.
Economic	– more evidence is needed on the economic benefits of implementing m-Health apps, – lack of access for patients to reimbursement mechanisms for some solutions, – limited awareness of service providers on the benefits and savings of m-Health apps.
Technical	– lack of standardised data transmission protocols, limiting the effectiveness of m-Health app solutions, – lack of interoperability, – late involvement of medical specialists in the creation and design of m-Health solutions.
Related to the structure of healthcare systems	– lack of coherence in cooperation between different levels and sectors of healthcare, which limits the scale and effectiveness of m-Health implementation, – change in managing m-Health application implementation processes, requiring time-consuming modification of the healthcare system.

Source: own study based on Smarżewska, 2018.

According to the 2011 report by the World Health Organization, the main obstacles in the use and continuous development of the m-Health sector included: security, cost, interoperability, scalability, and lack of knowledge about programme implementation. Concerns were also raised about conflicting policies in government healthcare systems and legal issues. Figure 4 illustrates the most common barriers to m-Health technology (Gleason, 2015).

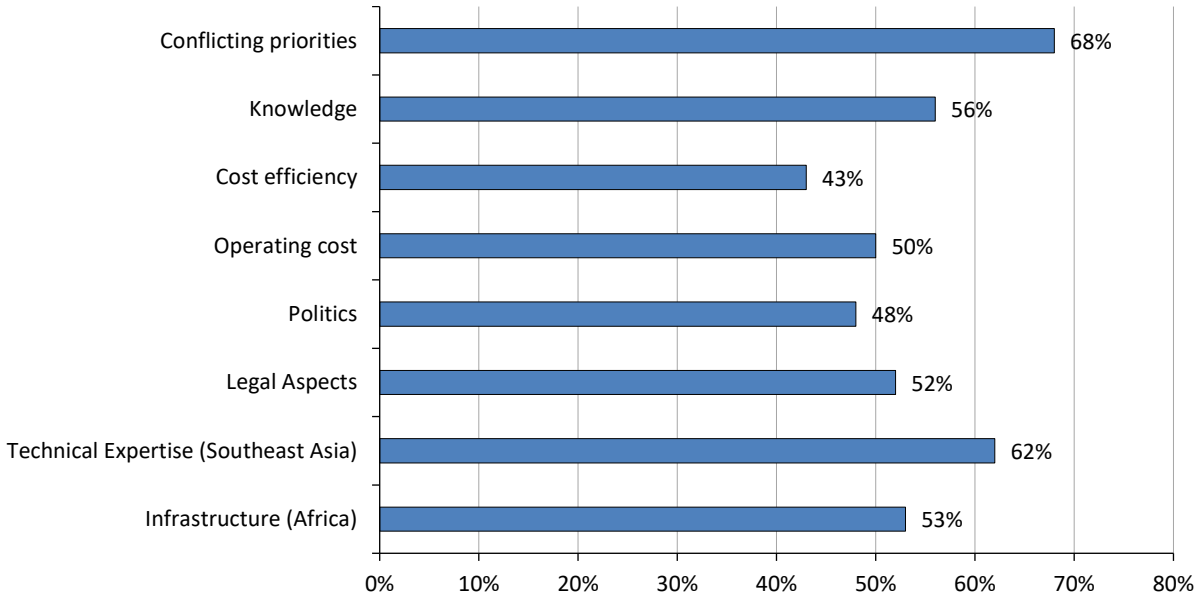

Fig. 4. Global average of top barriers to m-Health by WHO regions

Source: own study based on Gleason, 2015.

The threats perceived by users include: leakage of private data, access to personal data by third parties, poorly secured networks, network or operating system failure, and lack of software updates (Furmankiewicz et al., 2016).

Trust in mobile technologies and services is one of the most significant barriers to implementing and using mobile solutions, including health apps, within the healthcare system (Smarżewska, 2018). According to Ejdys (2017), the primary determinants affecting the level of trust in technology are risk and the degree of human dependence on technology.

5.2. Facilitators in the Use of m-Health Applications

Mobile phones have become an integral part of daily life in recent years, and mobile applications play an essential role in the health sector, however the effective implementation of m-Health technology that improves service delivery depends on acceptance by those who provide it. The main benefits that m-Health brings include improved efficiency, cost reduction, and faster delivery of medical care with minimal risk. M-Health platforms offer various features, including diagnostic support, patient education, surgical planning, post-operative care, motivation for physical activity, dietary adjustments, and support in treating chronic diseases (Zakerabsali et al., 2021).

The introduction of apps that operate on smaller devices than traditional computers, such as tablets or smartphones, has significantly changed the patient care process. Medical staff can access patient data anytime and anywhere, requiring only Internet access and the appropriate device. This allows for the prescription of medication and the selection of proper treatment. The benefits of using health apps include:

- cost reduction by limiting in-person visits and hospital stays,
- remote patient monitoring,
- shifting the care of chronically ill patients to their homes,
- medication reminders through notifications, which improve treatment continuity,
- motivating patients to adopt lifestyle changes and reducing the risk of diseases associated with a sedentary lifestyle by promoting healthy habits (Smarżewska, 2018).

The Ministry of Health, the NFZ, and the Ministry of Digitalisation introduced e-referrals and e-documentation, representing a significant step toward digitalising healthcare. Since 2020, all doctors in Poland must issue e-prescriptions, which patients can realised nationwide, which is a great convenience in a busy life. Mobile applications also allow for quick appointment scheduling, thus saving time (Dąbrowska et al., 2019).

Advantages of mobile applications include:

- mobility, enabling access to data from any place and at any time,
- ease of use,
- availability of electronic documentation,
- multi-level access authorisation mechanisms (e.g. mObywatel with e-prescriptions) (Furmankiewicz et al., 2016).

6. Conclusion

Current trends in mobile app design indicate a growing popularity of programs that combine high functionality with a focus on usability and aesthetics. Health apps that have gained significant popularity in recent years attract their users with a straightforward interface, muted colour schemes, and appropriately matched graphics. Functionalities such as the availability of verified health information, the ability to monitor well-being, and facilitating access to medical care are also important.

Despite the many available health apps on the market, users have limited information about their quality, making informed decisions difficult. Platforms such as Google Play and the App Store offer only subjective user reviews, which may not be sufficient to assess an app's reliability. Therefore, independent sources (for example, industry and medical organizations, certification agencies, scientific and academic research, non-governmental organizations (NGOs), and platforms dedicated to the evaluation of health applications), must verify the quality of apps, especially those health-related, which can significantly impact their users' lives. Mobile apps should be intuitive, contain verified, reliable information, and have a consistent and aesthetic appearance.

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Aplikacje mobilne jako narzędzia wspierające zdrowie w erze cyfrowej – technologiczne, zdrowotne i społeczne aspekty m-Health

Streszczenie

Cel: Celem niniejszego artykułu jest przedstawienie kompleksowego przeglądu technologicznych, zdrowotnych i społecznych aspektów użytkowania aplikacji m-Health. Artykuł analizuje zarówno potencjalne korzyści, jak i wyzwania związane z ich wdrażaniem, a także wskazuje przyszłe kierunki badań, które mogą wspomóc skuteczną integrację tych technologii z systemem opieki zdrowotnej.

Metodologia: W badaniu zastosowano przegląd literatury jako główną metodę badawczą. Analizie poddano publikacje i raporty dotyczące dynamicznego rozwoju technologii mobilnych, ze szczególnym

uwzględnieniem wzrostu liczby aplikacji wspierających monitorowanie zdrowia i codzienną opiekę zdrowotną.

Wyniki: Analiza wykazała, że wraz z postępem technologicznym urządzenia mobilne stały się integralnym elementem codziennego życia, co przyczyniło się do znacznego wzrostu liczby aplikacji mobilnych, w tym aplikacji m-Health. Aplikacje te cieszą się rosnącą popularnością dzięki możliwościom monitorowania parametrów zdrowotnych oraz wspierania działań profilaktycznych. Jednocześnie stwierdzono, że mimo dynamicznego rozwoju rynku, wiele z tych aplikacji pozostaje niedopracowanych, a ich jakość nie jest wystarczająco walidowana.

Implikacje i rekomendacje: Wyniki badań wskazują na pilną potrzebę wprowadzenia bardziej rygorystycznych standardów oceny i walidacji aplikacji m-Health oraz intensyfikację analiz nad integracją technologii cyfrowych z systemem opieki zdrowotnej, celem zapewnienia ich skuteczności, bezpieczeństwa i personalizacji ich funkcji.

Oryginalność/wartość: Praca ta stanowi oryginalny wkład w rozwój zdrowia cyfrowego poprzez kompleksową syntezę zagadnień technologicznych, zdrowotnych i społecznych związanych z aplikacjami m-Health. Artykuł identyfikuje kluczowe luki w zakresie jakości i walidacji tych narzędzi, wytyczając jednocześnie kierunki przyszłych badań i rekomendując praktyczne rozwiązania dla efektywniejszej integracji technologii mobilnych z systemem opieki zdrowotnej.

Słowa kluczowe: m-Health, aplikacje mobilne, monitorowanie zdrowia, system opieki zdrowotnej, technologie zdrowotne