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The Role of Digital Health Tools in Improving Contraceptive Use Among Reproductive Age Women

Florence Omowunmi Opatunji,
(RN, RM, RPOn, BNSc, M. Sc)
Department of Maternal and Child Health Nursing, School of Nursing Science, Babcock University, Ilishan-Remo, Ogun State

Prof. Christiana Olanrewaju Sowunmi (PhD.)
Department of Maternal and Child Health Nursing,
School of Nursing Science, Babcock University, Ilishan-Remo, Ogun State

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ABSTRACT: *This article offers a thorough examination of the connection between contraceptive techniques and digital health technologies, clarifying their crucial roles in family planning and reproductive health. The introductory portion explores various contraceptive techniques, highlighting the significance of personalised decisions that take into account individual circumstances. The article explores a wide range of contraceptive alternatives, including barrier methods like condoms and modern Long-Acting Reversible Contraception (LARC) therapies. It acknowledges the impact of these options on making educated decisions about contraception. The article then transitions to the realm of "Digital Health," exploring the progression of telemedicine and its incorporation of artificial intelligence. The investigation spans several avenues via which digital health technologies are transforming the provision of healthcare, namely in the domain of sexual and reproductive health and rights (SRHR). The next sections analyse Digital Health Tools (DHTs) and its many manifestations, such as mobile apps, wearable devices, and internet platforms. These instruments are portrayed as catalysts for empowerment, offering knowledge, resources, and assistance pertaining to contraception. The article examines the advantages of digital health technology in improving understanding and compliance with contraceptives, while also analysing possible disadvantages such as difficulties in connecting different systems, fairness issues, and hazards to the privacy of data.*
KEYWORDS: digital health tools, contraceptive use, reproductive-age women

INTRODUCTION

The convergence of contraceptive techniques with digital health technologies creates a dynamic and evolving environment within the larger domains of family planning and

reproductive health. This extensive article explores the wide range of contraceptive techniques that are accessible to people and couples, acknowledging their crucial role in facilitating well-informed choices for family planning. Our examination encompasses a range of contraceptive methods, including barrier measures such as condoms, hormonal contraceptives, and Long-Acting Reversible Contraception (LARC) therapies. The reseachers emphasise the significance of making personalised choices that are suited to one's own circumstances.

In the current day, technology is being extensively incorporated into several aspects of our life. This write-up focuses on the transformation in healthcare, often referred to as "Digital Health." This inquiry includes the progression of telemedicine from its first phases to the current day, driven by improvements in artificial intelligence and information technology. The article explains how digital health technologies are significantly changing the way healthcare is provided, specifically in the field of sexual and reproductive health and rights (SRHR).

The article also specifically addresses Digital Health Tools (DHTs) and their capacity to transform the use of contraceptives. DHTs are categorised and analysed based on their several manifestations, including mobile apps, wearable devices, and online platforms. Each of these forms serves a distinct purpose in delivering information, services, and assistance pertaining to contraception. Although these technologies provide advantages, the analysis examines possible disadvantages such as technological interoperability difficulties, equity issues, and data privacy hazards.

In this article, the researchers also emphasis the importance of digital health technology in improving contraceptive education, adherence, and user engagement. The use of technology into family planning aims to provide individuals and couples with comprehensive knowledge on contraceptive techniques via mobile applications and track physiological markers through wearable devices, so enabling them to make educated decisions. The investigation also encompasses the possible disadvantages and difficulties, emphasising the need for a fair evaluation of both the advantages and hazards linked to digital health technologies in the field of contraception.

Ultimately, the integration of contraceptive techniques with digital health technologies is crucial for advancing reproductive health, enabling family planning, and providing fair and equal access to information and services. This document provides a thorough examination of the changing environment, offering insights into the present condition, difficulties, and possible directions for future investigation and advancement in this vital convergence of healthcare and technology.

Overview of Contraceptive methods

Contraceptive methods are crucial instruments in the field of family planning and reproductive health, providing people and couples with the capacity to make well-informed decisions on the timing, manner, and desire to have children (WHO, 2020). There exists a wide array of contraceptive methods, but, not all methods are suitable for every circumstance. The optimal choice of contraception is contingent upon an individual's holistic well-being, age, sexual activity frequency, number of sexual partners, future childbearing aspirations, and familial medical background. Facilitating universal access to individuals'

chosen contraceptive methods promotes several human rights, such as the rights to life and liberty, freedom of thought, speech, and choice, and the rights to employment and education. Additionally, it yields substantial health and other advantages. Barrier measures, like as condoms and diaphragms, provide a tangible obstruction to impede the movement of sperm towards the egg. These procedures are easily obtainable, cost-effective, and provide a certain level of defence against sexually transmitted diseases (STIs). Recent research highlights the need of using regular and accurate use to maximise its efficacy in avoiding unwanted pregnancies and sexually transmitted infections (Gbenga-Epebinu et al., 2020).

Hormonal contraceptives, such as oral contraceptives, transdermal patches, and injectables, are commonly used forms of contraception. Current studies have prioritised the development of more convenient and durable alternatives, such as subdermal implants and intrauterine devices (IUDs). These approaches have shown significant efficacy in preventing pregnancy, and current research has investigated their influence on lowering menstruation symptoms and enhancing general health and wellness (Gbenga-Epebinu & Ogunrinde 2020).

Long-Acting Reversible Contraception (LARC) treatments, such as hormonal intrauterine devices (IUDs) and subdermal implants, have become more popular because of their effectiveness and ease. Recent research highlights the importance of offering women precise information and opportunities to use long-acting reversible contraception (LARC) techniques, since they are linked to reduced rates of unwanted pregnancies and higher levels of user contentment (Gbenga-Epebinu & Ogunrinde2020).
Emergency contraception (EC) options, such as the morning-after pill, provide a last recourse to avoid pregnancy after unprotected sexual intercourse. Gemzell-Danielsson et al. (2020) have conducted recent studies investigating the safety and effectiveness of ulipristal acetate and copper IUDs as extremely efficient methods of emergency contraception.

Tubal ligation and vasectomy are irreversible contraceptive techniques. Recent study emphasises the need of well-informed decision-making, since these approaches are not readily reversible. Furthermore, it emphasises the responsibility of healthcare practitioners in guaranteeing that people may avail themselves of these choices after they have achieved their desired number of children (Lopez et al 2020). These approaches vary in their mechanisms of action and efficacy in preventing unwanted pregnancy. The efficacy of approaches is quantified by the annual rate of pregnancies per 100 women using the procedure.

Contraceptive techniques are crucial for maintaining reproductive health and facilitating family planning. Current research in the topic has prioritised enhancing the availability and efficacy of different contraceptive methods, while also considering user preferences, minimising unwanted births, and enhancing overall reproductive health. Seeking guidance from healthcare experts is crucial for people to make well-informed decisions on contraceptive methods that are most suitable for their specific requirements and circumstances.

The demand for family planning among women has seen a significant surge over the last twenty years, rising from 900 million in 2000 to around 1.1 billion in 2021 (World Family Planning 2020). From 2000 to 2020, the prevalence of women using a contemporary contraception technique rose from 663 million to 851 million. By 2030, it is estimated that an extra 70 million women will be included. The contraceptive prevalence rate, which refers to the proportion of women aged 15-49 who use any form of contraception, had a little rise from 47.7% in 2000 to 49.0% in 2020, as reported by World Family Planning in 2020.

Digital Health Tools

In recent decades, it has been evident that technology is the first consideration when discussing the future of practically all fields. The rapid and awe-inspiring rate at which artificial intelligence and information technology are transforming the world is indisputable. One area where we see this rapid progress is in the realm of medicine; the convergence of emerging technology and healthcare is often known as "Digital Health." Senbekov et al., (2020) asserts that this approach is essentially straightforward: using technology methodologies and procedures to enhance individuals' welfare while simultaneously enabling patients to make more educated choices about their health. However, the intriguing aspect of digital health is in the intricate complications that arise from this very straightforward explanation. Senbekov et al discusses why digital health is transforming the healthcare industry, with advancements such as wearable gadgets and telemedicine.

Telemedicine is a broad field under digital health that involves the use of electronic communication methods, such as phone and video chats, for medical diagnosis (Aina et al., 2023). Darkins and Cary (2000) state that the first recorded instance of telemedicine occurred in 1897. During a telephonic appointment, a physician diagnosed a youngster with croup, which is a viral illness affecting the airways and is characterised by a unique cough. Although technology emerged early on, long distance diagnosis was only available for Antarctica expeditions and eventually for space missions roughly 9 decades after this incidence. In the latter part of the 20th century, advancements in ultrasonic imaging methods, artificial organs, and DNA sequencing elucidated the extent to which technology may be used in the field of medicine. These innovations facilitated the advancement of digital health beyond telemedicine, extending its scope from diagnosis to the forefront of therapy provision (Darkins, et al., 2000). The late 1980s and early 1990s were a prosperous era for digital health. During this period, several professional groups emerged in the United States of America and globally with the aim of enhancing healthcare delivery via digital communication. Notable examples are the International Medical Informatics Association (IMIA), the American Telemedicine Association (ATA), and the European Health Telematics Association (EHTEL).These organisations had a significant influence on the shift from conventional healthcare approaches to more sophisticated, technology-driven alternatives (Haleem, et al., 2021).

Channels of Digital Health Tool Use

Healthcare delivery is progressively shifting towards digital platforms, including the internet, mobile phone messaging, social media, applications, voice and video messaging, and telemedicine. The proliferation of mobile technology and quick advancements in artificial intelligence have greatly contributed to this trend. Digital communication platforms have extensive reach, enable precise targeting of messages to specific groups or people, and have the potential to improve the dissemination of sexual and reproductive health and rights (SRHR) information and assistance. According to Mushy, et al., (2020) recent advancements have introduced online testing for sexually transmitted infections (STIs), which has been shown to increase the number of STI tests taken by approximately two-fold. Additionally, there is now the option to obtain oral contraceptive pills online, known as e-contraception. Telemedicine in the field of sexual and reproductive health (SRH) may effectively address challenges related to

geographical, social, and behavioural obstacles that hinder access to treatments. Additionally, it can enable individuals to independently use SRH goods or services.It has been used to endorse pharmaceutical abortion and streamline the dissemination of abortifacient tablets with the assistance of remote care and support.Interventions that focus on various demographics and sexual and reproductive health and rights (SRHR) subjects in diverse cultural settings have shown acceptability among the intended recipients and practicality in their execution.Interventions may be developed to ensure accessibility among individuals from diverse socioeconomic backgrounds and those who are at a heightened risk. Evidence has shown advancements in understanding and the use of contraceptive or health-seeking behaviours. Chukwu et al., (2021) have noted that mHealth has effectively enabled the transmission of family planning information worldwide, leading to increased demand. Although social and new media are widely used, SMS remains the most effective method for reaching literate and semi-literate young people on a large scale. There is a strong correlation between owning a cell phone and using contemporary contraception in Burkina Faso. The findings indicate that it is important to consider the selective nature of cell phone ownership and the biases associated with it when designing family planning programmes or conducting surveys using cell phones (Iacoella et al., 2022).

Functionality of the digital health tool used by reproductive age women

While various healthcare facilities and professionals such as clinics, hospitals, community health workers, and chemists remain the primary sources for family planning services, clients now have the option to access information, schedule clinical appointments, seek advice from providers and counsellors, and even purchase necessary supplies through phone and internet-based platforms. With the growing worldwide prevalence of mobile phones, especially smart phones, a larger number of people will have the ability to use these new channels for accessing information and receiving services. Digital health technologies are a significant area of focus in sexual and reproductive health (SRH), since they have the potential to greatly enhance the accessibility and voluntary use of services. Utilising digital health technologies may enhance the efficiency of providing family planning services and conducting campaigns (HIPs, 2018). Moreover, these tools have the capacity to overcome gender-related obstacles that impede access to and utilisation of family planning services among marginalised groups.

According to Abrejo et al. (2022), there is significant potential for using mHealth treatments to address family planning needs in Pakistan. Mobile phones may be used to enhance women's acceptance and availability of family planning services in the nation. Socio-economic inequalities in mobile phone ownership are present in Kenya, and relying only on mHealth is insufficient to enhance contraceptive awareness and use among Kenyan women. The importance of integrating mHealth with clinic services cannot be overstated. The results of Gbenga-Epebinu and Ogunrinde (2020) provide valuable insights for making strategic investments in mHealth initiatives aimed at promoting family planning and reproductive health. They provide clarification on the possible importance of demographic trends in mobile phone ownership and health results, while also illustrating the constraints of SMS services in connection to contraceptive habits.

Overview of DHT and their Potential to Enhance Contraceptive Use

WHO (2020) defines a digital health tool (DHT) as the use of mobile telecommunications and multimedia technology in health service delivery and public health systems. It may be used for many reasons such as promoting health and preventing diseases, delivering healthcare services, providing training and supervision, facilitating electronic payments, and managing information systems. mHealth refers to the use of mobile and wireless technology, including mobile phones, patient monitoring devices, personal digital assistants, and mobile software applications, to facilitate the accomplishment of health goals. The disparity in mHealth adoption levels between developed and developing nations is significant, with African countries exhibiting the lowest rates of adoption and North and South America showcasing the greatest rates. The predominant activity is the establishment of a health contact centre, closely followed by the use of short message services for scheduling appointments. Babalola et al., (2019) noted that the health profession is actively embracing the Information and Communications Technology (ICT) revolution, particularly in the domains of information access, storage, retrieval, analysis, and dissemination. This technology is positioned to change the way healthcare is provided, the level of patient satisfaction, and the cost of healthcare, among other factors. According to Senbekov et al. (2020), the use of medical digital technology may enhance the accessibility and flexibility of healthcare services for the general population. It includes the accessibility of publicly available information on health, medical treatment, problems, and current advancements in biomedical research. Currently, even in low-income nations, there is an increasing accessibility and availability of diagnostic and medical services.

Mobile Applications as a Digital Health Tool

Mobile applications (apps) are specifically intended for contraceptive purposes. They have become popular because of their ease and accessibility. These applications include functionalities such as contraceptive information, notifications for pill or patch use, monitoring of menstrual cycles, and utilisation of fertility awareness approaches. In addition, they may provide instructional materials, assistance in managing side effects, and facilitate access to telemedicine services for contraceptive advice and prescription renewals. Mobile applications provide the capacity to enhance the adherence to contraceptive methods, augment user understanding, and enable people to make well-informed choices about their reproductive well-being (Barro et al., 2022).

Contraceptive-focused mobile applications often include extensive details on different contraceptive techniques, including their efficacy, adverse effects, and instructions for use. These applications function as teaching tools, enabling folks to comprehend their contraceptive alternatives and make well-informed decisions. Research has shown that mobile applications may greatly enhance users' understanding of contraception (Anderberg et al.,2019). These applications enhance decision-making on contraceptive treatments by offering precise and current information.

An essential characteristic of contraceptive-centric mobile applications is the capacity to establish notifications for contraceptive use. These reminders may be especially beneficial for persons using treatments that need daily or periodic application, such as oral contraceptive

tablets or contraceptive patches. Research has shown that the use of mobile app reminders may effectively enhance contraceptive adherence by decreasing instances of missed doses and promoting regularity (Hu et al., 2020). Moreover, these applications often have monitoring functionalities that enable users to record their menstrual cycles, fertility periods, and other pertinent data. The ability to observe and monitor reproductive patterns may help people gain insight into their fertility cycles and make informed decisions about their contraceptive choices. Studies have shown favourable results in terms of the efficacy and user contentment with mobile applications that concentrate on contraception. In a research conducted by Ippoloti and L'Engle (2017), it was shown that users expressed significant satisfaction with mobile applications designed for contraceptive usage. They highlighted advantages such as greater understanding, improved adherence, and better connection with healthcare professionals. A further research conducted by Hu et al. (2020) revealed that the usage of mobile app reminders had a substantial positive impact on contraceptive adherence among users, in comparison to those who did not use the app. These results emphasise the potential of mobile apps to have a beneficial influence on the use of contraceptives and the experiences of users.

Although mobile applications have several advantages, it is crucial to acknowledge and tackle the privacy and security issues linked to the gathering and retention of personal health data. It is important to provide users with clear and comprehensive information on data privacy rules, as well as giving them the authority to manage the disclosure of their sensitive information. Developers and regulatory agencies must guarantee adherence to data protection regulations. The discourse around privacy and security issues linked to mobile apps has gained significant relevance in the current era of digital technology. The proliferation of mobile app use has given rise to worries over the safeguarding of personal data and the possibility for security issues.

Mobile apps often gather several forms of personal data, including location data, contact lists, browser history, and even biometric information. App developers or third-party marketers might use this data for targeted marketing or other objectives, which raises issues around privacy infringement. A study done in 2020 by academics at Northeastern University revealed that several widely-used Android applications were gathering and disseminating users' personal data without obtaining their express authorization, hence emphasising the magnitude of this problem (Choffnes et al., 2020).

Mobile apps are susceptible to security flaws that may be used by hackers. These vulnerabilities include a wide variety of security weaknesses, including inadequate encryption mechanisms and unsecured data storage, which expose users' sensitive information to unauthorised access. An illustrative instance is the 2020 occurrence concerning the widely-used video-sharing application TikTok, whereby security researchers identified several vulnerabilities that might potentially enable unauthorised individuals to assume control of user accounts (Smith et al., 2020).

Given the ongoing expansion of mobile app use, it is crucial to emphasise the significance of user privacy and security in order to provide a secure and reliable digital setting (Chukwu et al., 2021).

Wearable Devices as a Digital Health Tool

Contraceptive usage has included wearable technology, such as smartwatches and fertility monitors. These devices include functionalities such as measuring basal body temperature, monitoring menstrual cycles, and recognising fertility windows. Wearable gadgets may help people determine their most fertile days and adjust contraceptive techniques based on real-time data and personalised insights. They possess the capacity to augment the efficacy of contraceptives, particularly for fertility awareness-based techniques (Shaaban et al., 2020). Wearable gadgets have the capability to track essential physiological indicators, detect illnesses, provide medical interventions, and notify healthcare practitioners. For instance, there are wearable devices capable of quantifying blood pressure, glucose levels, oxygen saturation, and other parameters.

Wearable technologies have the capability to monitor and record several aspects of physical activity, including performance, calorie expenditure, heart rate, and more. In addition, they have the ability to provide criticism, guidance, and inspiration. Wearable gadgets have the capability to provide directions, maps, traffic updates, and location-specific services. Additionally, they have the capability to assist users in navigating new surroundings or monitoring their activities. One instance is the availability of wearable devices that can use GPS, compass, and accelerometer (Rahmani et al., 2022). Wearable gadgets have the capability to playback music, films, games, and other forms of media. In addition, they have the capability to activate phone conversations, text messaging, social networking platforms, and several other means of communication. Wearable gadgets, such as those mentioned by Rahmani et al. (2022), may use Bluetooth, Wi-Fi, speakers, and microphones.

Wearable gadgets have the ability to improve learning experiences by offering interactive information and facilitating personalised learning. Additionally, they have the capacity to assist users in acquiring new skills or information. For instance, there are wearable gadgets that are capable of using augmented reality (AR), virtual reality (VR), cameras, and sensors. Wearable devices with contraceptive tracking and monitoring capabilities are a promising and novel technology that may empower users with more control and knowledge on their reproductive health. Nevertheless, this technology also presents some obstacles and apprehensions that want attention and resolution. Hence, it is crucial to guarantee that users are adequately educated and assisted in using this technology in a secure and responsible manner, while also upholding and safeguarding their privacy.

These gadgets have the capability to quantify the electrical activity of the heart and identify any anomalies or irregularities. They possess the ability to aid in the identification or prevention of cardiac issues, such as irregular heart rhythms, myocardial infarctions, or cerebrovascular accidents. For instance, there are wearable gadgets capable of performing electrocardiograms (ECGs) at any given moment and location, such as the Apple Watch Series 6 or the AliveCor KardiaMobile 6L. These devices can assess the magnitude of blood pressure exerted on the arterial walls and provide insights into the cardiovascular system's well-being. They possess the ability to oversee or control problems such as high blood pressure, low blood pressure, or a pregnancy complication called pre-eclampsia. For instance, there are wearable devices, like

the Omron HeartGuide or the Withings BPM Core, that can constantly and non-invasively monitor blood pressure.

These devices have the capability to quantify a range of biological or chemical characteristics inside the body, including glucose levels, oxygen saturation, hormone levels, and more. They possess the capability to identify or manage medical conditions such as diabetes, asthma, or infections. For instance, there are wearable devices, like the Dexcom G6 or the Abbott FreeStyle Libre, that can measure glucose levels without the need for finger pricks. Common challenges include data quality, battery longevity, precision, privacy, security, and health equality. Data quality pertains to the accuracy, dependability, and comprehensiveness of the data acquired by wearable devices. Factors such as device calibration, sensor location, user behaviour, and ambient variables might have an impact on data quality. Inadequate data quality may result in imprecise or deceptive outcomes and suggestions, which can adversely impact users' health and well-being.

The usefulness and convenience of wearable gadgets are significantly impacted by battery life. Several wearable gadgets have a limited battery lifespan, necessitating regular recharging, hence inconveniencing users and restricting their uninterrupted use. Furthermore, several wearable gadgets may lack a reliable or steady power source, hence impacting their overall performance and functioning. Precision is another crucial factor of wearable gadgets, particularly those used for medical or health-related objectives. Accuracy pertains to the level of concurrence between the measurements obtained from wearable devices and the actual values of the parameters being measured. Accuracy may be affected by several variables, including the design of the device, the development of the algorithm, and the diversity across users. Erroneous measurements might result in erroneous positive or negative results, thereby causing unwarranted distress or injury to users.

Wearable technologies pose significant concerns about privacy and security, since they gather and retain sensitive personal information from users. Privacy pertains to the entitlement of users to regulate the individuals or entities that may get and use their data, while security pertains to the safeguarding of data against unauthorised access or modification. Nevertheless, privacy and security may be jeopardised by variables such as data leaks, hacking, malware, and phishing. The absence of privacy and security might subject users to vulnerabilities such as identity theft, fraudulent activities, extortion, and prejudice. Ensuring health equality is a further obstacle for wearable devices, since they may lack accessibility or affordability for some sectors of the population. Health equality refers to the equitable allocation of health opportunities and outcomes among diverse demographic groups. Health equality may be influenced by variables such as socioeconomic status, educational attainment, gender, and racial or ethnic background. Health inequity may lead to the emergence or exacerbation of health disparities and inequalities among various demographic groups.

Online Platforms as a Digital Health Tool

Online platforms refer to websites or software that enable people to get sexual and reproductive health services over the internet. Online platforms have become a simple and easily available

alternative for obtaining information, counselling, and acquiring contraception. These platforms provide telemedicine services, enabling users to remotely consult healthcare professionals for contraceptive prescriptions, counselling, and follow-up treatment. Online platforms may significantly enhance consumers' understanding, availability, and utilisation of contraceptives, particularly in low- and middle-income nations where such services are often restricted or inaccessible. As per a nationwide investigation of internet-based contraceptive platforms in the United States (FP DigitalHealthAssessment 2022).

These systems were found to elicit high levels of user pleasure, ease, privacy, and affordability, according to user reports. Furthermore, users have reported a heightened understanding of their contraceptive alternatives and enhanced compliance with their selected methods. Furthermore, internet platforms have the ability to connect with marginalised groups, like those residing in rural areas, young individuals, and those with little income, who may encounter obstacles in accessing conventional healthcare facilities. Online platforms may provide a diverse range of contraceptive options, including pills, patches, rings, injections, implants, IUDs, or emergency contraception, and conveniently send them to users' residences or chosen places (Akinyemi et al., 2019). Online platforms provide discreet and private services, which may be especially advantageous for persons encountering societal stigma or restricted availability of in-person healthcare treatments. According to Le Fevre et al. (2020), they possess the capacity to enhance the availability of contraceptives, diminish obstacles, and target marginalised communities.

Online contraceptive services provide customers with many advantages, including ease, privacy, cost, and a wide range of options. Nevertheless, internet contraceptive services encounter some obstacles and ethical dilemmas that require attention and resolution. Common hurdles often arise in relation to issues such as limited access, inadequate quality, strict regulation, and user choice. Usage Nevertheless, online platforms have several obstacles and limits, including the need for quality assurance, legislation, safety measures, efficacy, and user choice. Online platforms must also provide diligent monitoring and assessment of the effects and consequences of their services on users' physical and mental health and overall well-being (Lesley et al., 2021). Moreover, online platforms must take into account the preferences and requirements of users, including their cultural, religious, and personal values, as well as their medical history and susceptibility to risks. Online platforms should serve as a supplement to the current health care system rather than a replacement, offering consumers the choice to seek consultation from a health care practitioner if necessary. Online platforms must assure the provision of precise and evidence-based information and assistance to users, while also adhering to the legal and ethical norms of their respective nations.

Nevertheless, online platforms have several problems and limits, including the guarantee of quality, regulatory compliance, safety measures, efficacy, and user preferences. Online platforms must assure the provision of precise and evidence-based information and assistance to users, while also adhering to the legal and ethical norms of their respective nations. There are some obstacles and constraints that digital health technologies encounter, which need attention and resolution. Technological constraints, equality difficulties, and data privacy concerns are major challenges and restrictions. Technological hurdles include the challenges

or hindrances that consumers may face when it comes to obtaining, using, or upkeeping digital health technologies. These barriers include issues like inadequate internet connection, limited digital proficiency, device compatibility problems, and technical malfunctions.

Benefits of Digital Health Tools

Contraceptive digital health technologies have several potential advantages. To enhance contraceptive adherence, they may provide reminders and monitoring functionalities, hence mitigating the likelihood of unwanted births. Furthermore, these technologies augment user's comprehension and awareness of contraceptive techniques, adverse reactions, and possible interferences. Furthermore, they enable people to actively engage in making decisions about their reproductive health, fostering independence and well-informed judgements. Utilising digital health technologies may help address disparities in the availability of contraceptive information and services, especially for marginalised communities (Yousef et al., 2021).

Digital health technologies provide precise and evidence-based information on various contraceptive techniques, including their effectiveness, potential adverse effects, and use guidelines. Users have the ability to get extensive instructional material that specifically tackles prevalent misunderstandings, fallacies, and anxieties pertaining to family planning. The intervention often seeks to enhance knowledge and understanding of family planning technologies, their advantages, and the significance of reproductive health. This entails providing people with information on various contraceptive methods, debunking false beliefs or misunderstandings, and encouraging the practice of making well-informed choices. Dehlin et al. (2020) conducted a systematic evaluation to assess several digital health initiatives for family planning. The reviewers found that mobile phone-based treatments, such as text messaging and smartphone applications, were effective in enhancing contraceptive knowledge, use, and adherence. The use of IVRs (interactive voice response systems) and digital hubs also yielded promising results.

Individual and couples counselling focused on family planning. Interventions aimed at enhancing couples' communication often focus on altering people' perceptions and viewpoints. One example is an intervention conducted in Ethiopia that successfully changed the views of males about women receiving family planning without their participation. This intervention also resulted in an increase in contraceptive usage among individuals who were not using contraceptives at the beginning of the trial. Individualised family planning therapy is offered within the institution and within the community, addressing aspects such as knowledge, beliefs, attitudes, and self-efficacy. A study done in Guinea compared regular prenatal counselling to reinforced antenatal counselling. The findings showed that reinforced antenatal counselling led to larger improvements in understanding and increased use of contraceptives. The augmented counselling included individual sessions lasting 15 to 20 minutes with the prenatal care practitioner, focusing mostly on contraception. The research conducted by Camara et al. (2018) revealed that the providers used a toolbox and distributed contraceptive samples to aid in the process of counselling. Research has shown that treatment achieves optimal results when customised to the unique preferences and needs of each individual client.

There has been a significant surge in the use of Information and Communication Technologies (ICTs) in the healthcare sector during the last decade. Traditionally, the main objective of digital health tools for those who use or seek family planning goods or services has been to enhance users' understanding of family planning techniques and services. Recently, there have been advancements in digital tools that aim to modify the behaviours of users or prospective users by including aspects linked to service provision (WHO, 2018; Aung et al., 2020). According to family planning experts, including community health workers, digital technologies have served as tools to assist in their work and have facilitated communication, data collection, and training among different providers (HIPs, 2020). Amidst the COVID-19 pandemic, nations implemented lockdown measures and health systems swiftly transitioned to remote service delivery methods. This led to an increased reliance on digital tools such as chatbots, hotlines, and telehealth to facilitate the distribution of information and provision of services for family planning.

In their study, Dingeta et al. (2021) performed a thorough evaluation of digital health interventions aimed at promoting family planning. The reviewers determined that mobile phone-based treatments, such as text messaging and smartphone applications, were effective in enhancing contraceptive knowledge, utilisation, and compliance. The use of IVRs and digital platforms also produced promising results.Within this context, specialists in family planning want to assess the efficacy of digital health technologies in facilitating the acquisition and sustained use of contraceptives. There are two distinct interpretations of the term "sustainability" that are relevant in this context. It primarily pertains to the capacity to enhance the connection between customers and services and goods, with the aim of promoting the use and continuity of family planning services. The primary objective of most digital solutions for family planning is to increase its acceptance and continued use within a certain target population. However, a crucial goal is also to improve knowledge and attitudes about family planning in order to facilitate better-informed decisions for personal healthcare. To enhance their acceptance, digital health solutions are progressively including features that directly connect interested consumers with physicians or health products, either via electronic means or face-to-face interactions. Hence, it is essential to promote the adoption of sustainable family planning practices in order to ascertain the specific attributes that effectively stimulate the establishment of service delivery connections among diverse populations. There is a common misconception among some individuals that the use of contraceptives might lead to increased sexual activity in women or even cause infertility (Dingeta et al., 2021; Igras, et al., 2020; Lundgren et al., 2021). Family planning service providers in Senegal received refresher trainings on the fundamentals of interactive voice response (IVR) for basic mobile phones. Participants demonstrated significant knowledge enhancements even up to 10 months after the completion of the trainings (Diedhiou et al., 2015).

As part of a family planning campaign, midwives in Nigeria were shown in entertaining and informative films that could be accessed on Android-based smartphones and tablets. According to experts, using digital methods can save time and resources by eliminating the need to travel for trainings. This also reduces disruptions to service delivery. Qualitative interviews with midwives showed that the video content raised awareness about how provider bias can harm

clients (Levine et al 2016). The literature has shown the potential of mobile applications, SMS messaging, and other interactive technologies in enhancing contraceptive education, use, adherence, and decision-making for family planning. Further research is required to investigate the enduring effectiveness, capacity for expansion, and impact on reproductive health results in various populations and settings. The ideas of informed choice and digital family planning are closely linked and have a significant impact on enabling people to make well-informed choices about their reproductive health. Utilising digital health technologies may augment the ability to make well-informed decisions on family planning via the provision of precise information, tailored assistance, and convenient access to healthcare providers.

Drawbacks of Digital Health Tools

A potential technical obstacle that consumers may encounter is the interoperability of various digital health technologies, both among themselves and with the current healthcare system. For instance, many digital health technologies may lack interoperability with other devices, platforms, or systems, hence impacting the quality, integration, and interchange of data. Using several digital health technologies for contraceptive reasons might lead to confusion and inconsistency for both consumers and clinicians. An equity concern that consumers may face is the absence of different user groups being involved in the design and development of digital health solutions, resulting in inadequate representation and inclusion. For instance, many digital health technologies may fail to take into account the distinct requirements, inclinations, or principles of diverse users, depending on their age, gender, culture, or religion. These tools may be influenced in terms of their usability, acceptability, and efficacy for various users. A potential data privacy risk for consumers is the limited transparency and control they may have about the collection of their personal data by digital health technologies. For instance, some digital health solutions may neglect to provide users with information about the collection, storage, sharing, and use of personal data by these tools or by third parties. Such occurrences might undermine the trust and confidence that users have in these technologies and their suppliers.

CONCLUSION

This extensive research elucidates the complex interaction between contraceptive techniques and digital health technologies, emphasising their crucial roles in influencing the field of family planning and reproductive health. The study of various contraceptive techniques highlights the need of making personalised decisions that take into account individual circumstances, while recognising the complex aspects that influence decision-making. The incorporation of digital health technologies, including telemedicine, mobile apps, wearable devices, and online platforms, is becoming a powerful force that democratises access to information and services related to sexual and reproductive health. The research evaluates the problems associated with these devices, such as technical compatibility issues, equity concerns, and data privacy hazards, while also acknowledging their positive impact on contraceptive education and adherence. This study provides guidance for policymakers, healthcare practitioners, and academics in negotiating the changing relationship between healthcare and digital innovation, as technology progresses. It offers valuable insights in this dynamic confluence. In conclusion, the

combination of family planning and digital health presents a dynamic field with great promise. It requires continuous study, cooperation, and innovation to fully optimise its beneficial effects on reproductive health outcomes globally.

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