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USES AND GRATIFICATIONS OF MOBILE HEALTH APPLICATIONS FOR HEALTHCARE SERVICES AMONG CIVIL SERVANTS IN ANAMBRA STATE, NIGERIA

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ABSTRACT
Nowadays, deployment of digital technologies in health communications has positioned mobile health applications (m-health apps) as critical tools for healthcare services. Anchored on health belief model and uses and gratifications theory, this study examines the uses of m-health apps, gratifications obtained, and the dominant m-health apps used for healthcare services, among civil servants in Anambra State. A convergent parallel design (mixed-method design), comprising survey and in-depth interview, was adopted. A sample size of 378 civil servants, from 37 ministries, departments and agencies, was determined via Cochran's formula, but only 370 responses were returned and analysed. Quantitative data were obtained using structured questionnaire, while qualitative data were collected via in-depth interview, from (n=10) participants, who were purposively selected. Quantitative data analyses adopted descriptive statistics, and qualitative data analyses espoused thematic approach. Survey findings revealed Ovulation Calculator as the dominant m-health app, and civil servants in Anambra State used m-health apps for monitoring their weight, sugar level, cholesterol, ovulation, monthly cycles, mainly through their GSM smartphones. In-depth interview revealed similar uses, but added: tracking health status, physical fitness, consultation with healthcare experts, and access to general health-related tips. Major gratifications identified were: improved access to health services, reduced healthcare costs, convenience, time efficiency, and enhanced preventive healthcare practice. The researchers conclude that civil servants in Anambra State find m-health apps effective in satisfying their healthcare concerns; and recommend improved regulatory frameworks for m-health apps' content accuracy, data privacy, and affordable access to healthcare via mobile technologies.

Keywords: Mobile health, m-health applications, uses and gratifications, civil servants, digital healthcare, Anambra State.

Introduction
New media and digital technologies, such as: the Internet, computers, smartphones, electronic wearable devices, Artificial Intelligence (AI-driven systems), such as: ChatGPT and Grok, as well as, Internet-of-Things (IoTs), now, seem to be the key enablers of service delivery and communication across all sectors of society. In the health sector, these digital innovations have triggered unprecedented paradigm shifts, in the ways health consumers and healthcare providers exchange health-related information and services. The rapid evolution, pervasiveness, and adoption of mobile health (m-health) or electronic health (e-health) technologies, particularly, mobile health applications (m-health apps), across the globe, underscore their transformative role in modern healthcare systems (Xie & Or, 2023).

Despite the numerous benefits associated with e-health technologies: improved medication adherence, tracking health status, keeping records of health data and better self-management behaviour (see Dakkak & Ho, 2022); researchers have raised concerns regarding their patterns of use. For instance, Aungst et al. (2022) observed that m-health applications may pose privacy and security risks, as users' personal health information could be exposed to unauthorised access, and become susceptible to misuse or exploitations.

Globally, particularly in low-and middle-income countries, the exponential growth in mobile phone usage, over the past decades, has created significant opportunities for improved healthcare efficiency and accessibility; nearly 95% of the global population now has access to mobile network services (Alipour et al., 2025). Hence, integration and utilisation of m-health technologies, in the area of health, can enhance quality healthcare delivery services, by creating a convergence for seamless healthcare-related interactions between healthcare providers and health consumers.

For civil servants, many of whom engage in sedentary work patterns, m-health apps can provide convenient, regular, and cost-effective access to healthcare services regardless of time and geographical constraints. Thus, in recognition of the potential of digital health technologies to expand healthcare access and bring healthcare nearer to the people, the Federal Government of Nigeria introduced telemedicine in 2007, following the earlier introduction of mobile telephony in the country in 2000 (Ezema, 2021). Since then, access to healthcare services and health information has increasingly relied on information and communication technologies (ICTs), including the Internet and social media platforms (see Glinkowski et al., 2013; Ukwueze & Osuala, 2020). These new health-seeking practices are often described in literature, as: e-health, internet health, tele-health, health informatics, telemedicine, digital health or virtual health (Uzochukwu & Izunwanne, 2021).

Considerably, past studies have probed e-health awareness and utilisation of m-health technologies among different populations and across cultures (see Kayyali et al., 2017; Adum & Ejiofor, 2020; Nzekwe & Abaneme, 2021; Ezema, 2021); but, uses and gratifications of m-health apps among civil servants in Anambra State, Nigeria are, arguably, underexplored; hence, a necessity for this study.

Statement of the Problem

In Nigeria, empirical evidence shows that adoption and utilisation of digital health technologies for healthcare services and health information-seeking remain relatively low (Adum & Ejiofor, 2020; Woldaregay et al., 2018).

This low level of adoption suggests that many health consumers, including civil servants in Anambra State, are either insufficiently aware of mobile health (m-health) applications or are aware of their existence, but do not actively use them to meet their healthcare needs. The proliferation of numerous m-health applications and digital health platforms may also create confusion among users, potentially leading to misinformation and poor health decisions. Besides, the challenge of limited access to affordable healthcare services, coupled with inadequate government-driven e-health interventions, has continued to negatively affect health outcomes in Nigeria. Without deliberate efforts to integrate digital health technologies into healthcare delivery, national health indicators may remain among the poorest in Africa.

Consequently, adoption of digital health technologies, including m-health applications, has been identified as a viable strategy for expanding access to healthcare services, improving health information dissemination, and reducing the burden on conventional healthcare facilities, particularly, for civil servants, who often face time and mobility constraints, as a result of the sedentary nature of their jobs (European Union Report, 2018).

Although, a growing body of literature has examined e-health awareness, acceptance, and utilisation across different contexts (Peng et al., 2016; Tudor et al., 2022), most of these studies focus primarily on general adoption patterns or technological readiness; thereby, leaving a noticeable gap in empirical research. This study, therefore, specifically, investigates the uses and gratifications derived of m-health applications among civil servants in Anambra State, with a view to providing insights to policymakers, health apps' developers, and healthcare stakeholders, towards designing and promoting m-health solutions that effectively address the healthcare needs and expectations of health consumers.

Objectives of the Study

The purpose of this study is to examine the uses and gratifications of mobile health applications among civil servants in Anambra State, Nigeria. However, the specific objectives are:

i. To examine the uses of mobile health applications among civil servants in Anambra State;
ii. To identify the dominant or most commonly used mobile health application(s) for healthcare services among civil servants in Anambra State; and
iii. To ascertain the gratifications derived from using mobile health applications for healthcare services among civil servants in Anambra State.

Literature Review

The Concepts of E-health, M-health and M-health Applications

Kreps (2017) asserts that e-health encompasses the development, implementation, and use of evolving Health Information and Communication Technologies (HICTs), including m-health applications, to disseminate health information, deliver healthcare services, and promote public health. The World Health Organization (WHO African Region, 2021) defines e-health as the cost-effective and secure use of Information and Communication Technologies (ICTs) in support of health services, health surveillance, education, knowledge, and research. It can also be termed, internet medicine, electronic medicine or digital health.

On the other hand, m-health refers to the use of mobile devices, GSM phones, wireless technologies and smart wearable devices for healthcare delivery. Generally, m-health facilitates patient-centered healthcare, capable of strengthening healthcare systems, without compromising quality of care, despite time and geographic restrictions.

Hence, Silicon IT Hub (2020) states that m-health applications (e-health tools) are among the most significant innovations within the broader domains of telemedicine and health informatics. According to Rouse (2018), m-heath apps are 'software' programs and digital assets that provide or expedite health-related services, when downloaded, on-demand, and installed on computers and mobile devices, smartphones, iPhone, iPad and electronic wearable devices, etc. Using m-health apps, individuals, including civil servants, can obtain health information and services with minimal interference from distance or logistical barriers (Abodunrin & Akande, 2009). Such services comprise: patients monitoring, health tracking, remote consultations with medical experts and medication management, accessing health-related information, and participating in online health discussions and educational programs (Adebayo & Ofoegbu, 2014).

Interest in e-health and m-health technologies has surged in recent years, due to rising healthcare costs, low budgetary allocations to the health sector, and increasing pressure on healthcare providers and caregivers, mostly in developing climes (Choukou, 2021). As a result, in Anambra State, efforts to integrate digital technologies into healthcare delivery seem to have gained momentum. For instance, the Anambra State Government, in collaboration with the European Union and the World Health Organization, launched the Mobile Technology Health Insurance Platform (MTHIP) and Data Operations Centre (DOC) on 17 September 2020. These initiatives, spearheaded by the Anambra State Health Insurance Agency (ASHIA), aim to improve health data generation, enhance healthcare access, and provide financial risk protection, particularly for vulnerable populations, including civil servants (WHO Regional Office for Africa, 2024).

Evidence from developed economies suggests that strong e-health policies, advanced internet infrastructure, and sustained investment in digital health interventions contribute to high levels of m-health adoption (Gu et al., 2021). Conversely, healthcare systems in many developing countries, particularly in Africa, continue to face structural challenges, inadequate funding, poor infrastructure, limited technological skills, and weak policy implementation (Okaro et al., 2010; Akintaro & Adewoyin, 2015); particularly, in Nigeria, e-health and m-health adoption remain relatively low, due to factors, such as: limited awareness,

technological constraints, high internet costs, and preference for traditional face-to-face medical consultations (Egbuna, 2016; Adum & Ejiofor, 2020).

Nonetheless, the growing penetration of smartphones and internet connectivity suggests that m-health applications are gradually becoming accessible to diverse categories of health consumers, including civil servants. These applications and related digital health platforms, such as Aproko Doctor, MyFitnessPal, and other online health communities, can enable users seek health information, consult professionals remotely, monitor vital health indicators, and manage health conditions efficiently. Given the increasing reliance on digital technologies and the unique healthcare needs of civil servants, examining their uses and gratifications of mobile health applications becomes both timely and relevant.

Uses and gratifications of mobile health applications: A conceptual appraisal

The uses and gratifications of mobile health technologies in healthcare have been expanding in recent years. There is, therefore, a growing body of evidence supporting the value of m-heath apps in improving the quality of care for patients, when used in conjunction with traditional care. Thus, different m-health apps are now available to help health consumers and patients manage their medical conditions, particularly, in areas of: cardiology, endocrinology and mental healthcare.

Among the reported benefits of m-health apps to manage medical conditions of users include: enhancement of medication adherence, improve self-management behaviour, and facilitation of better communication between patients and healthcare providers (Dakkak & Ho, 2022). Commonly, in healthcare delivery, m-health apps support health information-seeking, remote consultations, data sharing, and cost-effective access to healthcare services. Other wide range of health functions of m-health apps are: monitoring body weight, blood pressure, blood sugar levels, heart rate, body temperature, malaria and HIV status, ovulation cycles, and chronic disease indicators, as well as, obtaining prescriptions and reporting health emergencies.

Significantly, Bhaskar and Rao (2022) observed that during lockdown periods, when physical access to healthcare facilities was restricted, m-health apps enabled virtual consultations, emergency response coordination, and continuity of care. These applications can prove instrumental in improving the efficiency, responsiveness, and resilience of healthcare systems, during public health emergencies, as experienced in Nigeria in 2020, during the COVID-19 pandemic. Similarly, Kreps (2017) noted that electronic communication tools in healthcare are used for diverse purposes, including: health information management, health education, data storage and retrieval, patient profiling, and medical diagnosis. The United States Food and Drug Administration (FDA, 2022) further highlighted that mobile medical applications assist healthcare professionals in diagnosing and managing diseases, while also empowering patients to manage their health, promote wellness, and access timely health information. As a result, m-health applications are rapidly being adopted by healthcare professionals, patients, and health consumers alike.

Besides, scholars have identified several dominant uses of m-health applications, comprising: treatment compliance, disease and data monitoring, health education, and the creation of digital health support systems (Hassen, 2020; Tudor et al., 2022). These uses correspond directly with the gratifications that users likely derive, such as: improved health outcomes, convenience, empowerment, and cost reduction. Recent reports further underscore that m-health applications enhance access to healthcare services, particularly for underserved and remote populations, while empowering users to track health data, set goals, and receive feedback from healthcare providers (AI and LinkedIn Community Report, 2024). Other gratifications include: chronic disease management, reduced healthcare costs, improved efficiency, timely responses to health inquiries, and enhanced health education and awareness (Prasad, 2024; Asaad, 2024).

Essentially, given the apparent lack of knowledge of new technologies, the United States Agency for International Development*, USAID* (2017), as cited in Isaruk and Sahabi (2020), averred that, for an individual to keep up with the progress and support of technologies, including m-health apps, such person requires skills to evaluate the pros and cons, and the value of different m-health apps, with proper advice from healthcare professional, before using the apps. Moreover, for maximum benefits, *AI and the LinkedIn Community Report* (2024) emphasized that it is important to check the source and credibility of the apps, read the terms and conditions and privacy policy, and choose the apps that best suit your needs and preferences.

Despite the evidence-based benefits of m-health apps, Latif et al. (2017) observed that in many developing countries, including Nigeria, m-health technologies are not growing at the desired pace, due to infrastructural, economic, and socio-cultural challenges. Therefore, it is essential to examine, not only the level of m-health apps' usage, but also the specific gratifications that could be derived from the usage, among civil servants in Anambra State, Nigeria.

Table 1: Some Popular Smartphone Sensors and their Applications for M-health

Sensors/Modules	**Domain**	**Applications**
Camera	Photo and video capture	It is being used for tracking different diseases, to view surgical effects, remote diagnostics, incision monitoring, skin disease analysis, and supervision of child health, etc.
GPS	Location tracking	It gives access to track the vulnerable patients, such as people with Alzheimer's disease and Ebola, by using contact-tracing apps.
Electrocardiograph	Cardiovascular disease monitoring	Electrocardiograph enabled mobile phone are being used in underdeveloped areas in China for surveillance of heart diseases.
Bluetooth	Data sharing and Communication	It enables the short range data communication between mobile phone and various health monitoring devices and wearable sensors.
Microphone	Voice recording	It enables the communication with doctors regarding diagnostic and clinical support. It also provides capital for the audio analysis to access patient's feeling with different diseases such as myotonic syndrome.
Accelerometer	Acceleration measurement	It helps to measure the device's orientation relative to earth and to estimate motion. It can be implemented in various patients' activity monitoring techniques such as step-counting of a person and gait monitoring (which can help in early diagnosis of other diseases like Parkinson).
Wi-Fi	Data sharing and communication	The Wi-Fi module empowers the mobile phone to communicate the health data to a physician for diagnostics and treatments.
Accelerometer, GPS, compass, gyroscope, barometer	Physical activities	The combined module of these sensors is being exploited for measuring the sedentary versus non-sedentary activities.
Microphone, accelerometer, GPS	Social engagement	This package enables the surveillance of mental health by monitoring the social encounters, conversationalist talks, anxiety, stress, depressive behaviour and crustal motion of patients.
Microphone, GPS, accelerometer, touch	Sleep pattern tracking	This module provides the effective information of disrupted versus continuous sleep patterns of a patient.

interface, light sensor		

Source: Latif et al. (2017)

Table 1 above shows that advancement in ICTs, encompassing rising penetration of the Internet, advent and ubiquity of smartphone and digital mobile devices, with connectivity possibilities or sensors, as well as, the growth and adoption of m-health apps for healthcare services and health information-seeking, is an enabler for m-health development in both developed and developing countries (see Dalton, 2017).

Review of Empirical Studies

Kayyali et al. (2017) examined the uses and recommendation of m-health apps by pharmacists, as well as, public perceptions, awareness, and uses of health applications among diabetic patients. The study adopted mixed-method research design, survey which employed questionnaire to collect data from pharmacists and the general public, followed by semi-structured interview with diabetic patients. Findings revealed that 60% of pharmacists recommended m-health apps to patients. Over 76% of respondents owned smartphones; despite high smartphone ownership among diabetic patients, only a few used diabetes-specific applications. Participants mainly used m-health apps for: visual aids, reminders, data recording, social support, and remote consultation with healthcare experts, although time constraint was the major barrier. The study concluded that in spite of the growing handiness of m-health apps, utilisation remained relatively low. However, users who adopted health apps reported positive gratifications as: healthier lifestyles and improved self-care, underscoring the potential of m-health applications in health promotion. While the study was conducted in England, the present study extends its discourse by examining uses and gratifications of m-health apps among civil servants in Anambra State, Nigeria.

Pai and Alathur (2019) explored awareness and use of mobile phones and m-health apps for health service delivery among students, working staff, and healthcare professionals in India. Using a cross-sectional survey design with 386 respondents, the study found that m-health applications were commonly used for managing menstrual cycles and chronic lifestyle-related conditions, particularly among female respondents. Awareness of the concept of mobile health was higher among technical students and working staff than among medical students and health professionals. Although the study provided valuable insights into m-health awareness and usage patterns, it focused largely on mobile phone use, rather than m-health applications, as integral software tools. In contrast, the present study specifically examines the uses of m-health apps and the gratifications derived from their use, among civil servants in Anambra State.

Mansour (2021) examined Egyptian physicians' knowledge and use of coronavirus-related m-health applications. Using a quantitative survey design, data were collected from 203 physicians. The study revealed high awareness and frequent use of COVID-19-related m-health apps, with physicians primarily accessing these applications through Android devices and often learning about them via social media and interpersonal networks. The findings highlighted the role of social learning in technology adoption, consistent with the assumptions of social cognitive theory. Although the study focused on physicians and pandemic-specific m-health applications, the present study broadens its scope, by investigating diverse m-health applications used by health consumers and examining their uses and gratifications, within non-pandemic eras.

Gulec et al. (2022) examined m-health apps' use, based on adolescent and parental factors, including socio-demographics, digital skills, and health indicators. The study involved a nationally representative sample (N=2500) of Czech adolescents, aged, 11 to 16 years, with one of their parents, participating in an online survey, in 2021. Participants were recruited by a professional research agency, using a quota system, to ensure sample representativeness.

Results revealed that more than half of the adolescents reported using m-health apps. Apps that counted number of steps were used most frequently, and adolescents whose parents reported higher perceived financial security, used the apps more regularly. Adolescents with higher health anxiety, and lower sleep quality, used m-health apps more frequently, to track calorie intake, weight, and health indicators. The study is related to the current study, with respect to uses and benefits of m-health apps, but differs, in terms of areas of study, population of study and methods of study.

Babu et al. (2024) compared the utilisation or uses of health apps among patients who visit pharmacies and health-stores in hospitals, and the level of awareness of health apps among people in Indian cities. A cross-sectional descriptive study was conducted with (n-270), who were using mobile health apps in the state, from January 2023 to June 2023. Participants were recruited from retail pharmacies and health stores located in different cities. Clients visiting pharmacies and health stores were approached and invited to participate in the study, and those who agreed were interviewed. Results indicated that majority of the participants (40%) used their health apps, at least once weekly. The main benefits of using mobile health apps were: tracking of health and gaining knowledge about health and fitness. However, main challenges reported by the participants included: inaccuracy of the app, inconvenience and apps not being user-friendly. The study concluded that mobile health apps inspired the participants to keep up their wellbeing and exercise, while assisting them in tracking and better managing their health. Whereas the study used survey only, and focused on an Indian population, the current study used both survey and in-depth interview, on a Nigerian population, mainly civil servants in Anambra State, Nigeria.

A synthesis of the extant studies reveals that, while m-health applications are increasingly recognised for advancing healthcare delivery, utilisation and benefits vary significantly across contexts and user groups. Most of the studies focused on healthcare experts or general populations in developed countries, with limited attention to health consumers in developing climes. More importantly, few studies have examined m-health application usage from a uses and gratifications perspective, particularly among civil servants in Nigeria. This gap underscores the need for the present study, which seeks to explore the uses and gratifications associated with m-health applications among civil servants in Anambra State.

Theoretical Framework

This study is anchored on two complementary theoretical contexts: Health Belief Model (HBM) and Uses and Gratifications Theory (UGT).

i. Health Belief Model (HBM)

The HBM, developed in the 1950s by social psychologists and public health researchers including Hochbaum, Rosenstock, Leventhal, and Kegels, was originally designed to understand why individuals failed to adopt preventive health measures. The Health Belief Model (HBM) is a psychological model used to explain, predict, and influence health-related behavior. It focuses on how individuals' perceptions and beliefs guide decisions to adopt or reject health behaviors, services or products, such as m-health apps. HBM underscores that the likelihood of adopting or accepting a health behaviour or product, depends on factors, such as: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Perceived susceptibility refers to an individual's perception of risk regarding health issues, such as potential data breaches when using m-health apps. Perceived severity reflects the perceived seriousness of potential health consequences or data breaches.

Perceived benefits involve recognition of advantages, such as easy access to healthcare advice and reduced costs, while perceived barriers include obstacles like poor network connectivity, lack of technical skills, or limited funds. Cues to action are stimuli that trigger behavior, such as health campaigns or peer

recommendations, and self-efficacy represents confidence in effectively using the innovation. It has since been widely used to predict responses to health interventions and compliance with treatments. In the context of m-health apps, the model helps explain why civil servants may or may not adopt these technologies, based on perceived risks, benefits, and external cues.

ii. Uses and Gratifications Theory (UGT)

Uses and Gratifications Theory is a mass communication theory that explains why individuals actively select specific media or technologies to satisfy particular needs. The theory emphasises that users are goal-directed, purposive, and motivated, choosing media based on the gratifications they expect to obtain (Dominick, 2002; Potter, 2012).Originally introduced by Herts Herzog in 1944 and later expanded by Katz, Blumler, and Gurevitch, UGT provides a counter-perspective and marks a remarkable departure from the earlier theoretical assumption that viewed media audiences as passive or dormant recipients of media effects (see Udeh et al., 2024). Instead, UGT now shifts the focus from *what media do to people* to *what people do with media* (Baran, 2009).

UGT identifies several categories of needs and gratifications, including cognitive (information and knowledge), affective (emotional satisfaction), personal and social integration, and tension release. Katz, Blumler, and Gurevitch (1974) outlined five core assumptions of the theory, notably that audiences are active, aware of their needs, and selective in media use. Rubin (1994) further refined the theory by emphasizing that media use is intentional, influenced by multiple factors, and competitive with other communication alternatives. Applied to m-health applications, uses and gratifications theory provides the most direct theoretical lens for this study. It explains why civil servants deliberately choose m-health apps to meet specific healthcare needs, such as: convenience, cost reduction, health monitoring, reassurance, and accessibility and how these gratifications influence continued usage of m-health apps for healthcare services.

Methodology

This study adopted a 'mixed-method' research design, precisely, a concurrent combination of quantitative and qualitative research designs, so as to obtain detailed understanding of the research problem and compare outcomes. For quantitative research design, survey method was adopted, while qualitative design involved In-Depth Interview (IDI) method, using IDI guide. The geographical area of study was Anambra State, Nigeria. However, the target population of study comprised all civil servants at the Anambra State Government Secretariat, Awka, estimated at 12,063. The figure was obtained from the Office of Head of Service of Anambra State, as officially captured in the most recent Active Staff Verification Exercise (ASVE).

To determine sample size, Cochran's (1963) principle, as cited in Ezema (2021), was adopted, to calculate the essential sample size for the required level of precision, confidence level and the estimated proportion of the attribute present in a population. It is most suitable for a large population that is certain (Nanjundeswaraswamy & Divakar, 2021). Cochran's formula is represented thus:

$$\mathbf{n = \frac{Z^2Npq}{Ne^2+Zpq}}$$

Wherein:
n = Sample size;
$\mathbf{Z^2}$ = An area under the acceptance region in a normal distribution, at 95% confidence level, often set at 1.96;
N = Total population;

p = Estimated proportion of an attribute that is present in the population, often set at 0.5 in social sciences, at 95% confidence level;
q = 1-p;
e = Preferred level of precision, often set at 0.05 in social sciences, at 95% confidence level.

Based on the above recommendation, the sample size of this study was determined as follow:

$$\mathbf{n} = \frac{(1.96)^2 \times 12063 \times 0.5 \times (1-0.5)}{12063 \times (0.05)^2 + 1.96 \times 0.5 \times (1-0.5)} = \frac{3.8416 \times 6031.5 \times 0.5}{12063 \times 0.0025 + 0.98 \times 0.5} = \frac{11585.3052}{30.1575 + 0.49}$$

$$\text{Therefore; } n = \frac{11585.3052}{30.6475} = 378.017 = 378 \text{ (approx.)}$$

Meanwhile, considering the large size of the target population, made up of different ministries, agencies and departments, it became relevant to select sample units from these different subgroups. To achieve this, a simple random sampling technique (randomisation) was adopted to give each stratum or study unit equal chance of being selected for study. The procedure involved *Balloting System Without Replacement (BSWOR)*, such that ten (10) ministries and departments were selected, as shown below.

Table 2: Sample Distribution (survey)

S/N	Ministries/Departments	Number of Staff	Sample Allocation/ Quantity of Questionnaire	Sample Proportion (%)
1	Office of the Head of Service	788	99	26.3
2	Ministry of Health	600	76	20.0
3	Ministry of Science &Technology	88	11	2.9
4	Ministry of Commerce &Industry	244	31	8.1
5	Ministry of Education	278	35	9.3
6	Ministry of Economic Planning &Budget	159	20	5.3
7	Ministry of Justice	285	36	9.5
8	Ministry of Culture & Entertainment	98	12	3.3
9	Ministry of Information	219	28	7.3
10	Ministry of Lands, Survey & Town Planning	241	30	8.0
	Total	**3000**	**378**	**100**

Source: *Survey Sample Units, 2025*

Proportionate-to-size sampling approach was adopted to allocate samples and distribute questionnaire across the selected ministries and departments. Proportionate-to-size sampling is defined as the percentage representation of each stratum (ministry and department), within the total population of the entire strata or sample units selected for study, from the aggregate population of study. Sample was drawn from each group in appropriate proportion to represent the population (Nanjundeswaraswamy*et al.,* 2021). The percentage of each stratum or subgroup, for sample distribution, was determined thus:

$$\frac{\mathbf{Ni}}{\mathbf{N}} \times \frac{100}{1}$$

Wherein; **Ni** = Population of a stratum within a larger population; **N** = Total population of the entire strata or sample units selected from the aggregate population of study.

However, to select sample size for IDI, a non-probability sampling technique was adopted, whereby (n=10) civil servants were purposively selected and interviewed, based on defined characteristics (see LeCompte & Preissle, 1993; Ary et al., 2002; Fraenkel & Wallen, 2003; Gall et al., 2007), comprising: those who were aware or had any experience about m-health apps; owned a smartphone or other internet-enabled mobile device; had downloaded and installed a mobile health app in their device; had access to the Internet; probably used m-health apps for healthcare, and were available and willing to be interviewed. Data collection was done in two phases, namely: first, physical administration of 378 copies of questionnaire on the respondents (for survey), although a total of 370 valid responses were returned and analysed, and second, in-depth interview of (n=10) participants, which involved a herculean process of booking appointments, careful and timed data recording and immediate transcription of recorded data, to avoid loss. Validity and reliability of instruments were achieved through an experimental, trial or pilot study. The instruments were further subjected to expert's review, to enhance face, content and construct validity, while data analyses involved quantitative and qualitative methods. For quantitative data (survey), descriptive statistics, such as simple percentage, was used for data analysis. Responses extracted from questionnaire were recorded as numeral data, and presented, using statistical frequency tables and pie charts. Data generated from IDI were presented qualitatively, using *narrative presentation* style and *thematically* analysed.

RESULTS

Table 3: Respondents' Use of M-Health Applications for Healthcare Services

Variable	Frequency	Percent
Yes	273	73.8
No	79	21.4
Can't say	18	5.0
Total	**370**	**100**

Source: Field survey, 2025

Data in Table 3 simply demonstrate that the majority of civil servants in Anambra State (273 or 73.8%) use m-health app to access healthcare services; implying that they are likely active in seeking alternative means to healthcare services, and reduce the usual stress of long queues at hospitals and clinics.

Table 4: Respondents' Frequency of Using Mobile Health Apps for Healthcare Services

Variable	Frequency	Percent
Very Often	87	32.0
Often	39	14.3
Rarely	147	54.0
Total	**273**	**100**

Source: Field survey, 2025

Table 4 reveals that the majority of civil servants in Anambra State who use m-health apps for healthcare services and health information-seeking, do not actually engage with the apps consistently, as maybe expected. This degree of use may be attributed some factors, such as: limited technical know-how or poor understanding of how m-health apps function, poor network connectivity, rising cost of data subscription, predilection for traditional method of health information-seeking, or other constraints affecting sustained engagement.

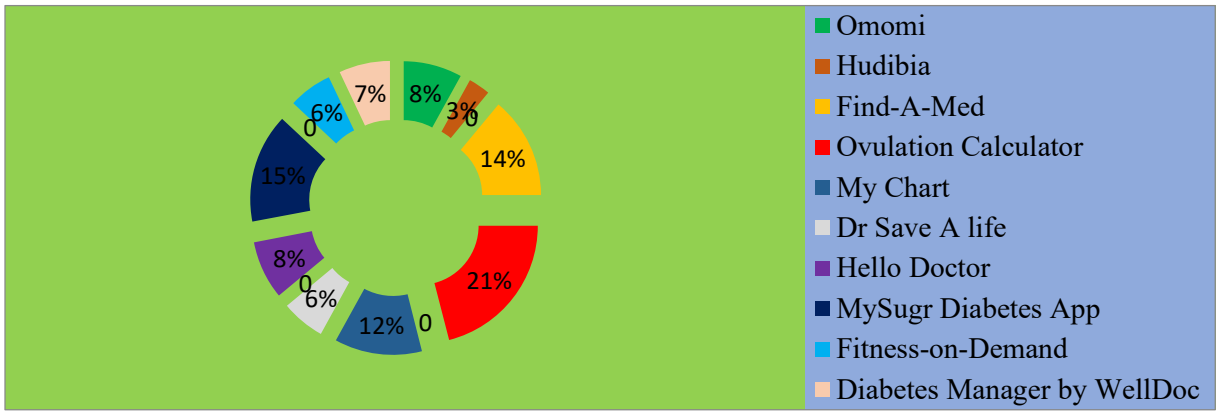
Table 5: Respondents' ICTs Device for Access to M-Health Applications

Variable	Frequency	Percent
Desktop Computer	12	4.4
IPad	27	9.9
Laptop Computer	59	21.6
IPhone	15	5.5
GSM Smartphone	152	55.7
None of the above	08	2.9
Total	**273**	**100**

Source: Field survey, 2025

As shown in Table 5, GSM smartphone (152 or 55.7%) is the commonly used ICT device for access to m-health apps among civil servants in Anambra State. This suggests a more user-friendly nature and probable cost-effectiveness of GSM smartphone, when compared with other devices.

Figure 1: Respondents' Most Preferred Mobile Health Applications for Healthcare Services



Source: Field survey, 2025

From Figure 1, the dominant mobile health apps used for healthcare services and health information-seeking among civil servants in Anambra State is Ovulation Calculator App (21%), which is basically used among women to track their ovulation, monthly cycles and fertility related issues. This result supposes that there is likely a rising interest in management of women's' health reproductive health, mostly, among the civil servants of reproductive ages. They need to actively track their monthly periods, keep proper records, and monitor when ovulation would occur, in order to achieve fertility. This result could, also, suggest that more female civil servants in Anambra State use m-health apps more than their male counterparts.

Table 6: Respondents' Ways of Using M-health Applications for Healthcare Services

Variables	Frequency	Percent
For engaging in physical exercises, checking blood pressure, heart function, malaria parasite, etc.	77	28.2
For monitoring weight, sugar level, cholesterol, ovulation, monthly cycles, etc.	101	37.0
For consulting with health practitioners on drug prescriptions, other healthcare tips, etc.	59	22.0

For reporting healthcare emergencies.	36	13.2
Total	**273**	**100**

Source: Field survey, 2025

As shown in Table 6, civil servants in Anambra State mostly prefer using m-health apps that satisfy specific and common health concerns: monitoring weight, sugar level, cholesterol, ovulation, monthly cycles, which suggest that they consider preventive healthcare more important than reactive care.

Table 7: Effectiveness of M-Health Apps in Providing Respondents' Healthcare Needs

Variables	Frequency	Percent
Very Effective	56	21.0
Effective	109	40.0
Not Effective	75	27.4
Can't say	33	12.0
Total	**273**	**100**

Source: Field survey, 2025

As presented in Table 7, majority of the respondents (40%) perceived m-health apps as effective in meeting their healthcare needs. The finding simply indicates that civil servants in Anambra State regard m-health apps as useful and result-oriented digital health tools that support their healthcare. It could also imply that through m-health apps, civil servants can stay at the comfort of their homes or offices to consult with healthcare professionals and seek health-related information.

In the same vein, qualitative responses gathered through in-depth interview are presented as follows:

Interviewee 1,

I have m-health app in my Infinix smartphone. I used *Ovulation Calendar*. You know, there are those of us who have short memories. So, I used this *Ovulation Calendar*, Ovulation Calculator, or Menstruation Calculator, to check my A to Z of my menstruation and ovulation; knowing when it started, when it ended, and when it was supposed to start again. It prepares me for the coming of the menses or the ovulation. Basically, I use it monthly or on monthly basis.

Interviewee 2,

Yes, I have three, *My Calendar App*, which is the one I use all the time. I also have *Flow App*. *Flow* App is good. *Flow* is next to *My Calendar*. They are in my mobile smartphones. I think I have one on my laptop. These three apps are rendering one particular service, that is, to track my monthly periods and ovulation. The main issue is tracking my fertility days, because as a young girl, you need to know when you are off, and if your days are odd or normal, and when to start the next one, so that it does not come all of a sudden. These apps are more like an *'Assistant Health Officer'*. And if your case seems to be complicated, or the apps seem not to really understand you exactly, they can refer you to see a doctor. I use them every month.

Interviewee 3,

I have a follow-come app, Samsung health, and my Period Tracker. Both apps are in my Android phones, Samsung, and now Infinix smartphone. *Samsung health* helps me check BP, heart rate, calories tracking, disease' signs and other health checks. For the Period

Tracker, it helps me track menstrual cycles and my ovulation periods, and when one is safe. I use my apps consistently.

Interviewee 4,

I have DrSavealife mobile health app. It is installed in my Android smartphone, Techno Spark5pro. With this app, I can access healthcare, everywhere I go, and at any time. I must not first rush to a clinic. I can check signs and symptoms to understand the possible cause of my ailment. I can speak with a Doctor through the App, or if I need referral, through the app, a contact health expert can connect with me through an option, *chat with me*, and I could be referred for hospital physical visit. There other uses of the app, such as: reporting medical emergency, and getting health advice. For me, I mainly use the app to check signs and symptoms of diseases and get other medical information. The app is just a *mobile healthcare support tool*- it doesn't provide finally solution; it links you to understand the likely health problem that you have, and know the possible solutions. The app is useful, though I use it not too often.

Interviewee 5,

I use a smartphone. But I have never made it a habit to use m-health apps. Most of the time, when I have a health issue, I still go to a physical clinic or pharmacy. I have very minimal usage of the apps. I once installed Google Fit, because my phone prompted me to try it, and I used it briefly to count steps. I have not used m-health apps more, because I do not know which ones are trustworthy or effective.

Interviewee 6,

Yes, I have m-health apps installed in my devices. I primarily use a smartphone to access these apps; but, occasionally. I also access them via my tablet. I actively use them for healthcare services. These apps help with: weight control, nutritional balance, physical activities, and general health education. I find them incredibly useful for self-monitoring and staying informed, without constantly visiting a hospital. I rely on them regularly as an integral part of my health routine. In addition, I occasionally use meditation and sleep apps, like Headspace and Calm, especially, during stressful periods. I have also explored menstrual tracking apps, which are helpful for understanding hormonal patterns. Over time, m-health apps have become, not just supplementary tools, but *essential components of my preventive healthcare strategy*.

Interviewee 7,

I have m-health apps installed in my Android smartphone, which is the primary device I use to access them for healthcare services. I also sometimes use my laptop or tablet. I actively use these apps for my healthcare needs, like searching for health-related information.

Interviewee 8,

I, currently, have no m-health app actively installed in my phone, although I might have used something like Google Fit, briefly in the past. I use an Android smartphone. But honestly, I have not made it a habit to rely on digital apps for my health. I usually prefer visiting a clinic or asking a pharmacist, when I need help. I have never fully adopted them. I think a lack of trust and a preference for face-to-face consultation are key reasons why I have not incorporated m-health apps into my healthcare routine.

Interviewee 9,

> I have multiple m-health apps installed in my Android smartphone. I also access them from my laptop and smart-watch, especially for syncing fitness data. I also use apps like: *Ada Health* for symptom checking, *Medscape* for researching medications and diagnoses, Health-Tracka for booking home-based tests, and Google-Fit for monitoring activity levels. I use them on a weekly and sometimes daily basis, depending on the situation. My healthcare needs are diverse, so I rely on these apps for tracking symptoms, scheduling lab tests, monitoring blood pressure and glucose levels, and learning more about conditions that affect me or my family. These apps are a core part of how I manage my health, today.

Interviewee 10,

> Since I am not very familiar with mobile health apps, I do not have any such apps installed in my phone or other devices. I have seen and accessed health-related ads online, but I did not realize they were part of something called 'm-health apps'. I use a basic smartphone, mainly for calling, messaging, social media, and occasional browsing. I have never used it specifically to access health services or information. When I have health concerns, I either go to a clinic or speak directly to a pharmacist or doctor. That's the method I have always known and trusted.

Comparatively, survey found Ovulation Calculator App as the most dominant m-health app used for healthcare services among civil servants in Anambra State; but, a thematic analysis of the interviewees' responses, as presented above, could not establish any m-health app that is commonly used for healthcare services; rather different m-health apps were identified, with their specific functions. This disparity in IDI and survey finding can be linked to the individualized nature of healthcare needs of the interviewees, and the open-ended structure of the IDI instrument, which allowed participants to freely share their experiences and possibly mention the apps that are relevant to their specific healthcare contexts. As a result, interviewee 9, specifically, stated, *"My healthcare needs are diverse, so I rely on these apps for tracking symptoms, scheduling lab tests, monitoring blood pressure and glucose levels, and learning more about conditions that affect me or my family"*. In other words, while survey data identified a dominant application through predefined options, qualitative data highlighted a fragmented and personalized usage pattern of m-health apps among civil servants in Anambra State.

The responses from interviewees 1 to 7 and interviewee 9, except interviewees 8 and 10, showed a substantial agreement with the findings of survey, regarding the uses and usefulness of m-health apps for healthcare services, mainly through GSM smartphones, and other identified digital devices. Using both instruments, respondents (civil servants in Anambra State) found the use of m-health apps effective, and they used m-health apps, mostly, for: monitoring their weight, sugar level, cholesterol, ovulation, and monthly cycles, keeping heath records, remote consultation with healthcare professionals, access to health-related information, among other variety of uses.

However, there is a departure in the findings of both instruments, with regard to frequency of use of m-health apps. In terms of the frequency of use, survey data established that respondents used m-health apps *rarely* for healthcare services, while results from in-depth interview found more regular or unswerving use of the apps by the respondents, either daily, weekly or monthly.

Table 8: Respondents' Gratifications from Using M-Health Apps for Healthcare Services

Variable	Frequency	Percent
Better access to variety of healthcare services, personalized search for health-related information, from everywhere,	111	40.7
Decrease in healthcare expenses or costs,	72	26.4
Rapid consultation with healthcare experts on healthcare issues,	43	15.8

Ease of reporting health-related emergencies,	29	10.6
All of the above.	18	6.6
Total	**273**	**100**

Source: Field survey, 2025

In Table 8, data reveal that the majority of civil servants in Anambra State (40.70%) enjoys better access to variety of healthcare services, as well as, personalized search for health-related information, from everywhere, while using m-health apps for healthcare services. That is, users of m-health apps could stay at the comfort of their homes or offices, and access a wide range of health-related information and consult with healthcare providers, despite time and location constraints.

Meanwhile, the 18 or 6.6% indication of *all the above*, simply denotes that there are other gratifications of m-health apps, namely: decrease in healthcare expenses or costs, rapid consultation with healthcare experts on healthcare issues, and ease of reporting health-related emergencies.

On the other hand, responses from in-depth interview, regarding the gratifications derived from using the m-health apps for healthcare are presented as follows:

Interviewee 1: My number one benefit is that my m-health apps helped me keep health records.

Interviewee 2: Confidence! You are on track. You have easily tracked your menses, you have tracked your ovulation. So, you are confident that this will come out, like today, or this will come out, next week. It does not consume money, like all the things you do at the normal, everyday hospital. It is time saving, because once you click, you are not queuing in line, except you do not have data at all. So these are my major benefits. Then, it deals with you one-on-one, except for once that you want to invite your partner. Flow app has that option to invite your partner to help also track it with you. So you see, it is very intimate; in the hospital, your file could get into someone's hand, and you do not know who the person is…

Interviewee 3: The functions they provide give me gratifications, by knowing that daily, I get the results of my health issues. For instance, the Period Tracker with its daily health update, gives me satisfaction, the same as Samsung health.

Interviewee 4: … saves time. Another advantage is comfort. You can relax and feel at ease to access healthcare, even in your own room or anywhere. Distance is not a barrier. I don't have to start running to a clinic to queue, get approval, and wait for my medical folder to be found, before seeing a doctor. I spend less to use the app. Also, using the app gives me the opportunity to take preventive measures in managing my health, instead of waiting to be carried on a tricycle or stretcher to a hospital.

Interviewee 5: The time I used Google Fit, it was helpful to see how many steps I had taken each day, and it made me more aware of how active or inactive I was.

Interviewee 6: Specifically, I gain benefits such as: instant access to health information, symptom checking and advice that help me determine whether to seek further medical attention or not, personalized health insights, like calorie tracking and sleep monitoring, mental health support, through mood trackers and guided meditations. These apps satisfy my need for quick, accessible, and trustworthy healthcare guidance, and they help me make informed-decisions about my lifestyle and medical conditions. Furthermore, I have noticed improvements in consistency with physical routines like exercise and hydration, due to app reminders. They also reduce unnecessary hospital visits by helping me assess non-

emergency conditions. For someone living in a busy urban area, having immediate access to virtual consultations or advice saves a lot of time. These apps also help me maintain medical history records, which are useful for personal review or sharing with professionals during checkups.

Interviewee 7: The biggest gratifications for me include: quick and accurate access to health information, real-time monitoring of fitness goals and medical indicators, reduced anxiety, convenient access to medications, especially through e-prescriptions. That sense of being in-charge of my health, and the ability to make informed-decisions, through app-based awareness, is very satisfying.

Interviewee 8: From the little exposure I have had, I can say they can be convenient for basic health tracking, like: counting steps or monitoring sleep. I could benefit from features like: easy appointment booking, medication reminders, or access to health articles. These tools could help me manage minor health concerns or stay informed, without any need to visit hospitals for everything.

Interviewee 9: They give me *peace of mind,* especially when I experience unfamiliar symptoms. Instead of panicking or self-medicating, I can run my symptoms through an app like Ada health, and get a basic idea of what is going on. In fact, some of my key gratifications include: health education tailored to my conditions or lifestyle, early alerts on health risks, better health tracking, especially for exercise and nutrition, reduced hospital visits for routine information or follow-ups. Overall, these apps help me stay informed, 'take preventive action', and manage my health, from anywhere and at any time.

Interviewee 10: Since I do not use mobile health apps, I have not experienced any benefits or gratifications from them. My entire healthcare routine is still based on in-person consultations and physical prescriptions.

Beyond 'better access to variety of healthcare services, as well as, personalized search for health-related information, from everywhere', as obtained from survey; a thematic analysis of the in-depth interview responses revealed other gratifications, which include: m-health apps help users keep medical records and histories, gives one confidence, self-assurance and comfort or ease of tracking health status, give a sense of independence, peculiarity or confidentiality in managing one's health, time-saving, m-health apps are personal, less expensive and offer rapid services, help users engage in preventive healthcare practices, useful for physical exercise and nutrition, afford peace of mind, guarantee health education tailored to one's conditions or lifestyle, provide early alerts or notifications on health risks, better health tracking, and allow access to variety of health tips.

Discussion of Findings

Findings from survey revealed that majority of the civil servants in Anambra State (273 or 73.8%) used m-health apps for healthcare services and heath information-seeking, mainly through their GSM smartphones (55.7%). Significantly, evidence from the in-depth interview corroborated this result, as most interviewees reportedly accessed healthcare services using m-health applications which are installed, primarily, in their smartphones, as well as, other mobile digital devices. These findings agree with Pai and Alathur (2019) and Alipour et al. (2025), who reported that approximately 86% of nurses in southeastern Iran used smartphones, as gateways to m-health applications. The findings also support the observation of Eikey and Poole (2014) that the increasing penetration of smartphones, perhaps, together other digital devices, has contributed significantly to the growing popularity of mobile healthcare experiences.

Similarly, Alipour et al. (2025) observed that in low and middle-income countries, including Nigeria, the rapid growth in mobile phone ownership, over the past decade, has created new opportunities for improving healthcare efficiency and access.

Specifically, survey result showed that, although civil servants in Anambra State actively used m-health applications for healthcare services, the majority of them (147 or 54.0%) reported using m-health apps rarely, indicating that while adoption could be relatively high, sustained or regular engagement remain limited by certain factors (see Table 4). This finding is in agreement with Adebara et al. (2017), who found that despite high awareness and positive attitudes toward m-health applications, users' willingness to expand and intensify m-health usage was relatively low.

Regarding the dominant m-health applications used for healthcare services, Ovulation Calculator App (21%) emerged as the most popular application. In addition, most respondents (101 or 37.0%) reported using m-health applications, primarily, for monitoring weight, blood sugar level, cholesterol, ovulation, and menstrual cycles, while underscoring the effectiveness of m-health apps in meeting their healthcare needs. The greater preference for Ovulation Calculator App suggests a growing interest in reproductive and menstrual health management, particularly, among women of reproductive age. This finding supports Pai and Alathur (2019) who reported that female users, predominantly, employed mobile health applications for menstrual cycle management and lifestyle-related health issues. The finding also agrees with Nwosu et al. (2023) who revealed that although awareness of m-health pregnancy applications among women of reproductive age in Anambra State was generally low, those who used the apps did so, mainly, for pregnancy monitoring, fertility guidance, and related reproductive health concerns.

Furthermore, a notable pattern that consistently emerged from this study, especially, from the interviewees, is an increasing emphasis that m-health apps are healthcare instruments for self-care, preventive healthcare, and proactive health management (see interviewees 2, 4 & 6). This perception is similar with Anderson et al. (2016), as well as, Morah and Okunna (2020) who similarly observed that m-health applications are predominantly used for self-care purposes, including: monitoring chronic conditions, menstrual health, fitness, and mental well-being.

Comparatively, there are dissimilarities in survey and in-depth interview's findings, regarding frequency of use of m-health apps and the dominant m-health apps. Both instruments revealed that civil servants in Anambra State actually use m-health apps and perceive the apps useful in providing their healthcare needs. However, qualitative data revealed additional uses of m-health usage as follows: checking blood pressure and heart rate, symptom assessment, interaction with healthcare professionals, appointment booking, fitness tracking, nutrition management, and health information seeking (see also: Anderson et al., 2016; Gulec et al., 2022; Tudor et al., 2022; Klenk et al., 2017).

The consistency between survey and in-depth interview's outcomes, regarding access, uses, and effectiveness of m-health apps, indicates a growing acceptance of m-health applications among civil servants in Anambra State. This supposition is supported by Jembai et al. (2022), who observed a generally positive attitude towards m-health technologies among health consumers; as well as, Choukou's (2021) assertion that the rising healthcare costs, limited budgets, and increased patient burdens have contributed to the surge of interest in e-health and m-health technologies globally. Meanwhile, while survey result showed an infrequent usage, interview finding revealed a more consistent use, either daily, weekly or monthly.

In terms of gratifications, survey finding showed that, while using m-health apps for healthcare services, civil servants in Anambra State gain better access to diverse healthcare services and personalized health information from anywhere. In-depth interview, however, revealed additional gratifications, including: health record keeping and medical history management, increased confidence and reassurance, privacy and confidentiality, time efficiency, reduced healthcare costs, preventive healthcare engagement,

peace of mind, personalized health education, early health-risk alerts, and improved self-efficacy. These findings reinforce Shah's (2025) assertion that m-health applications facilitate digital transformation in healthcare by bridging the gap between patients and medical professionals. The findings also support Kreps' (2017) view that electronic communication tools enhance healthcare delivery, information management, diagnosis, and patient profiling, while reducing healthcare costs and improving access (see Prasad, 2024, as cited in AI and the LinkedIn Community Report, 2024).

Generally, the results of this study strongly support the assumptions of uses and gratifications theory, which posit that individuals actively select media and communication tools to satisfy specific needs and desires (see Dominick, 2002; Baran & Davis, 2006; Potter, 2012). In this study, civil servants deliberately used m-health applications to gratify needs related to cost-effective healthcare services, convenience, efficiency, privacy protection, preventive care, and health information access, etc. Moreover, the findings of this study indicate that civil servants in Anambra State use m-health apps, having found the apps efficacious in providing their healthcare needs. This evidence clearly upholds the principle of health belief model that individuals' perceptions and beliefs guide decisions to adopt or reject health behaviors, services or products, such as m-health apps.

Conclusion

The study concludes that civil servants in Anambra State actively use mobile health applications, for healthcare services and health information-seeking, primarily, via their GSM smartphones. They prove strong predilection for m-health apps that address specific health concerns, such as: weight monitoring, blood sugar and cholesterol checks, ovulation and menstrual cycle tracking, access to health tips, and consultation with healthcare specialists. Female civil servants actively engage m-health apps, more actively, for healthcare services. M-health apps are mainly considered as digital health assistants in healthcare and preventive health practice; and serve as important tools for empowering users to take greater control of their healthcare decisions.

Recommendations

Based on the results of this study, the following recommendations are germane:

i. Government regulatory agencies, m-health application developers, and medical content reviewers should collaborate to establish standardized guidelines that ensure content accuracy, ethical compliance, and clinical reliability of m-health applications. In addition, m-health platforms should be fully encrypted and designed to guarantee robust protection of users' privacy and protection of health data.

ii. Government, organized private-sector and stakeholders, particularly, those in the telecommunications and technology industries should pool resources together to reduce the rising cost of the internet data and GSM smartphones. This could be achieved through subsidies, installment-based payment systems, or affordable loan schemes targeted at low-income civil servants and other health consumers, thereby enhancing equitable access to and use of m-health applications for healthcare services.

iii. Civil servants should improve on their ICT skills and media literacy, as well as, embrace digital revolution, while the government and internet service providers should enhance internet access, broadband coverage, and network reliability to reduce usage barriers.

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